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ART. I. *On the ancient Castles of Britain; their Security and Strength; their admirable Construction as Fortresses of Defence, before the Invention of Cannon; and the Devices employed in their Design, for protecting the Garrison, and for deceiving the Enemy, in the Case of a close Siege, &c.* By JOHN ROBERTSON, Architect.

BY tracing out, amidst the venerable ruins of ancient fortifications still existing in this country, their plan and general design, and by investigating the original causes of the peculiar construction of these monuments of antiquity, we are led to consider the progress of the arts, as well as the manners and customs of a people who required for their security such strongholds of defence; while the ingenious devices which the necessity for such security had suggested, and the means provided for the convenience of those who were to defend the fortifications in times of war, evidently evince the ingenuity and skill of the architects and engineers who had designed and executed them. The number of years, however, which have elapsed since these ancient remains were erected, render it necessary, in order to form a correct judgment upon them, and of those who had erected and defended them, that we should divest our minds, as much as possible, of the idea of considering the manners and customs of the present time as a standard by which to judge of that of the darker ages. A few important historical facts may be gathered by attentively examining these venerable remains of art, which are now speedily losing their antiquated forms, by the common decays of time, and by the encroachments of modern improvements. The investigation, however, must not be confined to any one building, but extend to the comparison of several of these structures one with another, in order to arrive at a just conclusion as to the points the architects intended to accomplish in their peculiar design and construction; which latter will be found to be very much alike in the whole of them, but the details varied

in each; while the principles of fitness were studiously attended to in the construction of them all.

Those castles erected in the tenth and eleventh centuries, on which the following are a few general remarks, were usually built on the brow of a hill or on the confines of a river; and consisted of a principal and smaller tower, the former being so situated as to command an extensive view of the surrounding country. An area was enclosed all round them for the use of the garrison, and they were fortified with strong outworks and deep ditches, over which latter drawbridges were erected. With regard to the structure itself, nothing could be more fitly adapted to serve the double purpose of security and state, than the ingenious devices employed in different parts of the building; but more particularly in securing the entrance to the fortress, so as to render it difficult of penetration by an enemy, and, at the same time, so magnificent as to suit the dignity of the lord of the castle.

The entrance was not in the lower story, or on the ground-floor, as in other buildings, nor even near the ground, where it might have been easily approached. It was by a grand portal, placed at a considerable height, to which a stair that went partly round two fronts of the castle, ascended. Before, however, the grand portal could be entered, the drawbridge had to be passed, which, when pulled up, cut off all communication with the stair; and about the middle of the steps there was a strong gate, which had to be forced before coming to the drawbridge. For farther security, the portal attached to the building was not the entrance to the fortress itself, but merely the entrance to a small tower; and both it and the latter might be destroyed, without the principal part of the castle, where the garrison was stationed, sustaining much injury. In this small tower was a vestibule, to which the entrance, or portal, led; and from this vestibule there was a second entrance, through another portal, placed in the thickness of the wall of the main tower, which was the real entrance to the castle. Both the first and second portals were each defended by a strong gate, and by a portcullis, sliding in stone grooves.

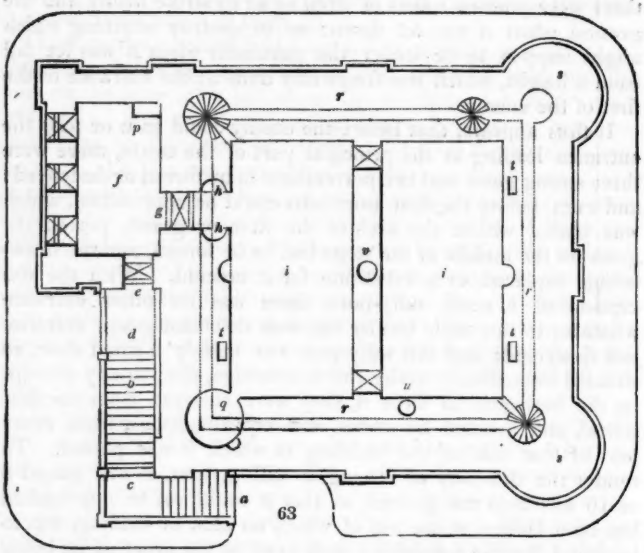
In these portcullises were the principal strength at the entrance of a fortification, against the attacks of an enemy, before the invention of cannon. They were composed of strong slabs of timber, closely framed together in the manner of grating, and transverse bars, for strength, placed so closely together as to leave only small square openings; the whole being well fenced with iron. They were made to draw up into a vacuity in the thickness of the wall, and to slide up and down in deep stone grooves on each side within the arch of the portal; which grooves could not be injured without pulling down the wall in which they were placed. On the under side of the framework

there were pointed spikes of iron, so as to strike firmly into the ground when it was let down; or to destroy anything which might happen to be under the portcullis when it was let fall from a height, which was frequently done at the entrance of the first of the enemy.

It thus appears, that before the enemy could gain or pass the entrance leading to the principal part of the castle, there were three strong gates and two portcullises to be forced or destroyed; and even before the first portcullis could be approached, which was placed within the arch of the first, or grand, portal, the gates on the middle of the steps had to be forced, and the drawbridge replaced, or a substitute for it erected. With the exception of a small sally-port, there was no other entrance whatever to the castle but by the well defended grand entrance just described; and this sally-port was merely a small door, so situated immediately under the drawbridge, that, in any attempt by the besiegers to force it, they were annoyed from the first portal, and assailed by stones, and other weapons, from every part of that side of the building in which it was placed. To render the difficulty of forcing it still greater, it was placed 8 or 10 feet from the ground, so that it could not be approached but by a ladder, at the top of which no plat, or landing, was to be found for the assailants; and, even in the event of its being secured by the enemy, the passage further was difficult to be forced, as there was only a narrow spiral staircase leading from it to the rooms above, which was just of sufficient width to let one person pass at a time, and secured by strong doors at the top.

In order to comprehend the foregoing arrangements, let us suppose *fig.* 63. to be the plan of the first floor of a castle constructed in this way: *a b* is the grand staircase, leading to the portal, and at the landing (*c*) there was a strong stone archway and gate; *d*, the situation of the drawbridge; *e*, the grand portal, and situation of the first portcullis; *f*, the vestibule; *g*, the entrance from the vestibule to the tower, behind the gate of which entrance the second portcullis was placed; *h h* were niches, having stone benches in them, for the convenience of those who kept the castle guard; and *i i* were, of course, the principal apartments for the garrison.

These castles were so well designed for the protection of the garrison in cases of a close siege, that the difficulty of forcing them, even after the outworks were taken, was very great; and the manner of constructing the openings, so that the besieged might neither be annoyed by the instruments of the assailants, nor experience any danger from firebrands, at the same time that the besiegers might be annoyed from within, are very curious, and extremely ingenious.



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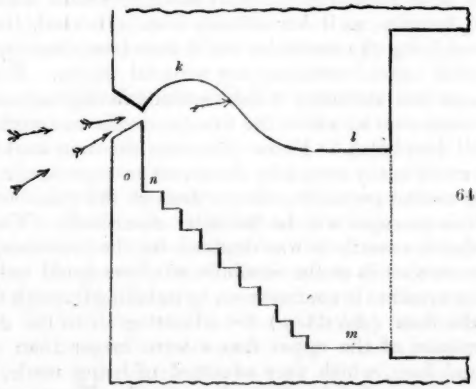
In the first place, there were no windows whatever on the ground floor, and even no other openings, except a few loop-holes on those sides of the building which were the most difficult to attack. These openings, where they occurred, were not more than 6 in. square; and they were situated in such places, and constructed in such a manner, that no weapon thrown in at them could enter far enough to fall into the apartments to do mischief, or fall farther than the bottom of the arches through which they were approached. On the first floor, also, on which was the entrance, there were no windows in the principal part of the structure, nor, indeed, any other openings, except a few loop-holes; and not even these on the entrance side, as they would have been too much exposed to the enemy, in the event of their gaining the steps to the drawbridge. In the third story, which contained the rooms of state, there were most magnificent windows; but the apartments were so lofty (generally between 30 ft. and 40 ft. in height), and the windows, which were at a very great height from the ground externally, were placed so near the ceiling internally, that they rendered it almost impossible for any weapon to be shot into the apartments in such a manner as to do harm; because over each window was a low arch, the whole thickness of the wall, which an arrow, stone, or firebrand, in its ascending course, would strike against: and, even in the event of any artificial means being

erected near the castle, so as to place the assailants on a level with the state apartments (for no natural mound, or other elevation, was suffered near a fortress, to give this advantage to an enemy); or, in the event of any weapon being shot from a distance with sufficient force to enter these apartments horizontally, then, as the windows were at such a great height above the head, any sharp instrument would merely lodge itself in the opposite wall, and any instrument or weapon not sharp would just strike against that wall, and, having spent its force, fall harmlessly to the floor.

From the manner of constructing the loopholes in the ground floor, it is evident that, while they admitted a portion of light and air, any offensive weapon could hardly enter the apartments in which they were placed. *Fig.* 64. is the section of an arch through the thickness of the wall, showing a section



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of the loophole, and the steps ascending to it. The loophole is placed at the outer end of the arch, and, by the latter being raised at *k*, it is not only placed at the top of the arch, but considerably above the crown of its entrance at *l*. As the loopholes, even on this floor, are at such a height above the ground externally, that any instrument shot into them must take an ascending course, it is clear that it would strike against the raised part of the vaulting at *k*, and, consequently, spend its force; and, as the steps do not commence at the entrance of the arch, the level part (*m*) at the foot of them would receive any weapon or firebrand which had spent its force at *k*; so that it would but very rarely even enter the apartment. Only the crossbow-men standing on the upper step at *n* could be hurt by the entrance of a weapon; and not even they, unless they were standing at the loophole, taking an aim at the enemy, the very moment it was

shot. These arches appear to weaken the walls, which they would certainly do, to a great extent, if the floor at *m* were carried out level to the perpendicular of the inside of the loophole; but the steps, which are united with the whole mass, give great strength to the wall; and there is sufficient thickness left at *o*, which makes this by no means a weak point against the attacks of an enemy. This floor was generally vaulted, and, in consideration of its strength and darkness, it was destined to hold the stores.

The apartments of the first floor, on a level with the entrance portals, were usually from 20 ft. to 25 ft. in height. Here there were no windows in the principal part of the fortress, nor even loopholes on the entrance side, for the reasons before assigned; but in the vestibule on this floor there were generally large magnificent windows (as shown on the plan); and these could only have been there to give dignity and importance to the grand entrance; because, as it has already been observed, the small tower, containing the vestibule, could have been destroyed without the great tower sustaining any material injury. No part of the garrison was stationed in the vestibule during a close siege; and the room over it, where the first portcullis was worked, had only small loopholes. From this room the men working this machine could easily escape by the secret passages leading to the top of the second portcullis, thence through the thickness of the wall (which passages will be hereafter described). The apartment under the vestibule was destined for the prisoners, so that any weapons shot in at the vestibule windows could only annoy those poor wretches in confinement, by its falling through the trap-door in the floor (*fig.* 63. *p*) for admitting air to the dungeon. The loopholes of the upper floors were larger than those of the ground floor, which they admitted of being made, as they were at a greater height above the ground. They were otherwise constructed in the same manner as those of the ground floor, except that, instead of stone steps ascending to them, there was merely a stone stage erected for the crossbow-men to stand upon. The guard-chamber was on the first floor, and was made in the thickness of the wall (*fig.* 63. *q*); and on this floor, also (however astonishing it may appear to us in a more civilised age), the chief part of the garrison was lodged. Their beds were merely straw spread upon the floor, on which they lay indiscriminately; the officer of the guard, however, having his small apartment (which had a fireplace and loophole) exclusively to himself.

In the rooms of state on the third story there were also loopholes behind the arras, which were constructed in the same ingenious manner as the others on the floors below; and, in addition to what has already been said respecting the magnificent

windows of these apartments, it may be farther added, that the arches cut in the walls to give light from them were purposely constructed so low and so close to the tops of them, that it was almost impossible for any weapon (except on such uncommon occasions as have been before observed) to pass across the room, or even to strike the ceiling; for, considering the angle at which any weapon had to ascend, from the great height of these apartments, as also the immense thickness of the walls, it would, in the majority of cases, merely strike against the vaulting over the windows.

For the convenience of the besieged, in cases of a close engagement, so that orders and implements might be speedily communicated and conveyed from one part of the castle to another, there were in the thickness of the walls narrow passages which led from one loophole to another, and from one window to another, all round the building. The situation of these passages is shown by the dotted lines on the plan (*r r*). They ascended and descended at different parts by small spiral steps, and by the acclivity and declivity of their floors. They formed a communication with the different points of defence, with the apartment over the vestibule, and with the cavities where the two portcullises were worked (over *e* and *g*, *fig.* 63.).

The apartments of the fourth and upper story were usually from 15 ft. to 20 ft. in height; and, that precaution which was necessary in the construction of the lower windows not being requisite here, in consequence of the greater height of this floor from the ground, the windows were therefore, in general, large and lofty, like those of the third story. These apartments, and the roofs of the towers, were the most convenient places whence the besieged could annoy the enemy, and where the chief and most powerful instruments of war, such as balistas, catapultas, &c., were placed. These instruments were most destructive, heavy, warlike engines, and were the principal artillery of that age. They were used by an offensive party for battering down walls, and in all cases for throwing large stones, which they were capable of doing to a considerable distance. They were composed of wood, and in such a manner, that the most powerful of them were even capable of throwing millstones. Stones of a considerable size were also thrown by slings.

The devices employed in the construction of these castles, in order to deceive and mislead an enemy, are worthy of notice. There are arches and portals to be seen, which have the appearance of being ancient entrances filled up; but that such were merely to deceive may be known by finding their exact relative situation with the interior, when it will be seen that these false entrances were not only against the solid side walls, but were

frequently placed against the end of an outside wall, or against the end of a transverse division wall; so that these seemingly weak parts were, in fact, the strongest parts of the structure; and any attempt at making a breach through them would be labour in vain. There were also small towers placed in one or two situations which had the appearance of being erected to strengthen weak parts of the building (*fig.* 63. *s s*); and these towers themselves had the appearance from without of being weak, from the notion that they contained apartments (which supposition was strengthened by their having loopholes), and, therefore, easy parts to be battered down. But that these erections were merely to deceive is evident, because they were not only placed at the strongest parts of the building, but they consisted of one solid mass from the bottom to the top, with the exception of a small but strong arch on each floor above the ground floor, which led to the loopholes; and their walls were frequently 20 or 30 feet in thickness. The small tower, also, which contains the vestibule, was most substantially built, notwithstanding its affected appearance of weakness. The foundations were exceedingly massive and strong; and, although weapons might be thrown in at the windows of the vestibule, they could do no great injury to this side of the principal tower. Even in the event of the smaller tower being battered down, which would have been by no means an easy task to accomplish, this side of the main tower presented a more substantial front to the enemy than any of the other sides, from the absence of openings on the first floor.

Although the uniformity in the general design of castles built in this age is very great, yet the means to deceive were devised and carried into execution by their architects in a variety of ways, in different buildings; so as to defy the besiegers, from their knowledge of the deceptions of one castle, to know where they were situated, or even to anticipate what the deceptions were, in any other castle; in the same way that the keys of all the locks in a private house have the same general appearance, but the wards so differently made, that the key of one lock cannot (or should not) open any other than that to which it belongs. The different parts where these deceptions were situated in various buildings, and the variety of ways in which they were devised, are without end; and herein consisted the next important points to that of strength to be considered by their architects. It was to observe as much secrecy as possible in regard to these deceptions, that the lords of such castles were so very scrupulous in admitting strangers, or in allowing them to examine the buildings, or in suffering the latter to be surveyed even by those who were known, but who were, in the probability of events, likely to become future foes.

There was much regard paid to the manner in which the stores and prisoners were secured, so that few or no soldiers were necessary to guard them, which enabled the whole force to be employed on the defence. The former were placed in the ground floor, which was so substantially built, and had no openings but mere slits for air (illustrated by *fig.* 64.), that they were perfectly secure from any accidents that might arise from the firebrands of the enemy; and the latter were confined in such a strong dungeon, that their rebellion or escape was impossible.

The dungeon, as before observed, was under the vestibule, and the walls surrounding it were of great thickness, without any openings whatever. The small trap-door for the admission of air, &c., in the floor of the vestibule, was at a great height above the heads of the prisoners, and great care was taken that nothing should be left in the dungeon, by means of which they might reach to it. Through this hole, when the besieged were pressed for time, the prisoners, as they were captured, were lowered down into their dungeon, and their scanty food was likewise let down through this opening: but there was also a communication with the dungeon from the ground floor of the castle. For greater security, the floor of the dungeon was considerably below the ground floor of the castle, and the communication to it was by a steep flight of steps descending through the wall; but these were so narrow, that only one person at a time could pass along them; and at the top of the flight, there was a strong door which shut them out from the ground floor of the main tower. In consequence of these steps being so narrow that only one man could get close up to the door at a time, and their being also so very steep that no one could stand firmly on them, it was impossible for the prisoners to make any effectual efforts to force open the substantial door which secured them in their awful dungeon. The dungeon was, likewise, strongly arched, and the floor of the vestibule was of stone.

The means devised for the easy conveyance of the great engines of war to the upper apartments, and to the top of the castle, as well as the stores to the different apartments, were very ingenious as regards the former and very convenient as to the conveyance of the latter. By examining the plan, it will be seen that it would have been utterly impossible to have conveyed the large beams of wood of which the catapultas and balistas were composed from the lower parts of the building through the spiral staircases and narrow passages; and to have conveyed them up through the floors and ceilings would have created great confusion in the apartments where the garrison was stationed, and much inconvenience in the state apartments. The stores, also, by being conveyed up the spiral staircases during a siege, would have caused disorder among the soldiers. In order to

obviate these inconveniences, there were several square wells, or flues (*fig.* 63. *t t*), which were made in the thickness of the wall, from the bottom of the building to the top. These wells opened out in the ground floor, under an arch of sufficient height to admit the turning of a long beam into them. In their ascent there were others branching off from them to the galleries, and there were also outlets from them on each floor; while, by their descending to the sunk floor, the stores were likewise conveniently drawn up through them to the several apartments.

In order to give quick alarm in cases of threatened danger, and, consequently, to transmit orders from one part of the building to another with the greatest possible despatch, there were small flues, about 8 in. square, cut, or rather left, in the thickness of the walls near the inner face, which went from the top of the castle down to several of the apartments below. They were likewise carried all round the castle (and even through the ends of the joisting), and from one apartment to another; so that the most speedy communication could take place between persons at a distance from each other in different parts of the building: they were, of course, used in a similar manner to the speaking-trumpets or pipes of the present day in large warehouses and manufactories.

Provision was made in these castles that the enemy could not cut off their supply of water in a close siege, as also for its easy conveyance to the apartments on the different floors. For these purposes, the well, in the first place, was generally made within the principal tower of the castle: it was frequently under an external, but generally under a division, wall (as at *u* or *v*, *fig.* 63.), so as not to interfere with the apartments, in hoisting water to the upper parts of the building. The opening of the well was carried up to the very top of the castle, where a pulley was placed, by which water might be raised to any height; and there were outlets from the opening of the well on each floor, through which the apartments were supplied. The water in the well would, probably, not rise so high as the level of the ground floor, although the opening of the well was carried up through the solid wall to the top of the building.

The outlets for the smoke, and those for conveying away any filth from the apartments, were well constructed for their respective purposes, while they offered no advantage to an enemy. The fireplaces were made in the external walls; and over the hearth, on which the fire was placed, the boundary of the fireplace, or what we call the jambs, formed a semicircular arch, which was in general very richly ornamented, especially in the state rooms. The flue was a conical cavity, ascending to an outlet, which had the appearance of a loophole from without, and ranging symmetrically with the others. From the angle of

ascent of the flues, no weapon shot in at them could do mischief, as it would strike against their upper surface, and, accordingly, spend its force; and, from their construction otherwise, it could not enter the apartments. The outlets from the sinks, &c., were constructed in a similar manner to the chimney flues, but, of course, reversed, and going downwards. Their descent was not, however, in a straight line, but slanting sidewise, with windings to their loopholes; so that it was impossible to throw a weapon into any apartment through them.

The apartments of the lord of the castle were exceedingly large, as well as lofty; and the great arches separating them were highly finished with curious workmanship; the doors were also highly finished, and richly ornamented. The lower parts of the rooms were hung with arras, and the windows were elegant as well as lofty; the arches of which, internally, sprang from cylindrical pillars, and the archivolts round the vaulting were curiously enriched. The whole was fitted up in a superb and elegant manner, to maintain the dignity and state of the commander.

From the foregoing remarks, it appears that the castles erected in the feudal ages were admirably adapted to the purposes for which they were intended; and this, indeed, ought to be the chief consideration of an architect, in the erection of a building in any age or country. If we take into consideration the methods devised in these castles, both for protecting the entrance and the garrison; the mode of construction, so as to protect the besieged from the assaults of the enemy; the devices to deceive the besiegers; the easy manner of conveying the engines of war to the upper apartments; and the method of giving alarm, &c.; we cannot but think that, in these ages, anterior to the invention of cannon, the architects and engineers have displayed much skill and great ingenuity in their art, superadded to their knowledge of constructive masonry.

Paddington, January 19. 1837.

ART. II. *Reasons for having an annual Exhibition of Architectural Drawings and Designs, distinct from the Exhibitions of the Royal Academy of Arts.* By W. S.

IT is acknowledged by all persons connected with architecture, that sufficient room was not given for the exhibition of the various designs of British Architects at the Royal Academy, when held at Somerset House; and it appears that at the new National Gallery they will be very little benefited by the change. Besides, the effect of architectural drawings is almost entirely destroyed, to the common observer, when they are

placed by the side of so much scarlet and glitter, in the form of portraits of military heroes, and other personages in dresses of bright colours, as appear among the paintings exhibited.

From the interest excited by the exhibition of the designs of the new Houses of Parliament, it is clear that the public in general are not wholly incapable of appreciating the merits of such productions, and are not indifferent to improvement in the art of design as applied to buildings.

It is true, that, since the establishment of the Institute of British Architects, and the Architectural Society, some exhibitions of architectural drawings have taken place at different times at their apartments; but these may be called comparatively private exhibitions, as only the members and their friends are admitted. However, from the patronage these Societies and their exhibitions have received from the few, coupled with the lively feeling expressed in favour of architecture in the case of the Parliamentary buildings, it is evident that something on a more extended scale, and of a more public character, is called for.

If a separate exhibition of architectural drawings and designs were established on a broad and liberal basis, it would tend to increase the taste for architectural improvement, and, consequently, would benefit the architects themselves; as the science would become better understood, and its professors more respected and employed. It was said by many, when it was proposed to exhibit the designs for the Parliamentary buildings, that nobody would go to look at them, except those parties immediately interested. The incorrectness of this prophecy is well known, for the number of persons who attended the exhibition far exceeded the expectations of its projectors. If such an exhibition of drawings, nearly all in one style of architecture, and all of only one subject, and by a very limited number of artists, created so much interest and discussion, surely an exhibition of numerous different subjects, by a great number of artists, would prove equally, if not in a greater degree, interesting to all parties, and, to the architect and student, a never-failing source for study and contemplation.

By an exhibition of architectural drawings, it is not meant that they should be confined to mere elevations and perspective views of exteriors and interiors of buildings; but that all drawings, sufficiently well executed, should be admitted, on any subject connected with the art of design, if applicable in any way to architectural purposes; such as designs for sculptured friezes, tablets, ornaments, patterns for papers, carpets, utensils, ornamental details, designs for furniture of every description, drawings of antiquities, &c. By embracing all these various subjects, the exhibition would be interesting and useful to all classes of persons.

Exhibitions on an extended scale would also be serviceable to the profession in another point of view; for artists could there place those of their designs which had been rejected in competitions, so that the public would have an opportunity of judging whether the best design for any building had been chosen; and the certainty that such an exhibition would be given to all the designs, would tend much to destroy the system of jobbing and trickery so constantly practised in such cases. By including in the exhibition designs for furniture, utensils, &c., the attention of the ladies might be drawn to the subject of suiting the style of their furniture to that of their houses; so that the effect of well-studied interiors might no longer be injured by the introduction of all kinds of incongruities in the shape of furniture.

It is only by a general diffusion of the knowledge of architecture amongst all classes that any real love and enthusiasm for the art can be produced; and, undoubtedly, one of the best means that can be employed to draw attention to the subject is a public exhibition, by showing what has been done, and what the art and the artists are capable of doing.

These few remarks are merely thrown out in the hope that the two Societies of Architects will shortly take the subject into their consideration; as there can be no doubt that it would be to the interest of each individual member, if an establishment of the kind were formed.

Tunbridge, March, 1837.

ART. III. *Experimental Essays on the Principles of Construction in Arches, Piers, Buttresses, &c.* By WILLIAM BLAND, Jun. Essay VIII. *Relative to the Architecture of small Churches and Cathedrals.*

THE Lady Chapel of St. Saviour's Church, Southwark. — *Fig.* 65. represents one side of this beautiful building, which shows a specimen of a series of cross arches, and pillars or piers. The particulars of the dimensions are as follows: —

The span between the piers is 13 ft. The height of the piers is 11 ft. 6 in. The height of the shaft is 10 ft. The diameter of each pier is 23½ in.; and their horizontal section is something of the form shown at *b*. The height of the masonry over the crown of each arch is 2 ft.

Now, in 13 ft. there are 156 in., which, divided by 6, gives 26 in. for the diameter of each pillar: but the diameter is 23½ in., therefore 2½ in. too small; consequently, each pier requires the reduction of 1 ft. 3 in. in the height, taken from the dimensions of the span; thus leaving 11 ft. 9 in. for the balancing height of

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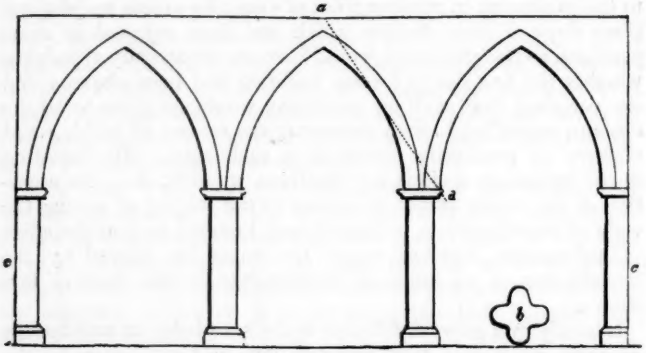

the piers: but the piers are 11 ft. 6 in. As their proportions approach so near to each other, it is probable that a mistake might have been made in the measurement of the diameter, by having allowed a trifle too much. The above proportions exactly coincide with those required for arches and piers running in a single series, as in Hartlip Church.

In the Lady Chapel, it has been stated that several series of arches and piers cross each other at right angles; therefore, according to the experiment fig. 158., Vol. III. p. 418., they will, thus circumstanced, carry double the weight of a single series.

The architects were fully aware of this, and availed themselves of it to give lightness and beauty to the structure, which they have admirably accomplished by the concave section up the four sides of every pillar.

The dotted line *a d* terminates at *d* on the outer edge of the pillar: *c c* are the walls.

Rochester Cathedral.—*Fig.* 66. shows a part of the crypt under the choir of this cathedral, consisting of a series of arches and piers crossing each other at right angles. The particulars of the dimensions are as follows:—

The span between the piers is 8 ft. 7 in. The height of the piers is 6 ft. 1 in. The height of the shaft is 4 ft. The diameter of each pier is 12 in.; and their form is alternately circular and octagonal, and not of one solid piece of stone. The height of the masonry above the arches is 2 ft.

In 8 ft. 7 in. there are 103 in., which, divided by 6, gives 17 in. for the true diameter: but the diameter of the piers is 12 in., and, therefore, 5 in. too small; consequently, each pier requires a reduction in the height from 8 ft. 7 in. to 6 ft. 1 in. to be in the balancing proportion to the span. Now, the piers are just 6 ft.

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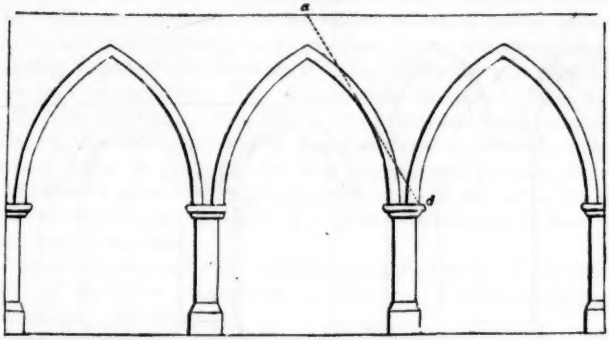


1 in. in height; therefore, they are strictly of the true balancing proportion to the span of the arches. The experiment shown by fig. 158., Vol. III. p. 418., proves the double strength of these cross arches and piers of the under croft.

The dotted line *a d* terminates at *d*, on the outer edge of the pier, the same as in the Lady Chapel.

The Nave of Rochester Cathedral. Relative to the Norman and Saxon arches and pillars near the tower.—*Fig.* 67. shows the arches and piers: the superstructure is not represented, and some of the Saxon arches are omitted.

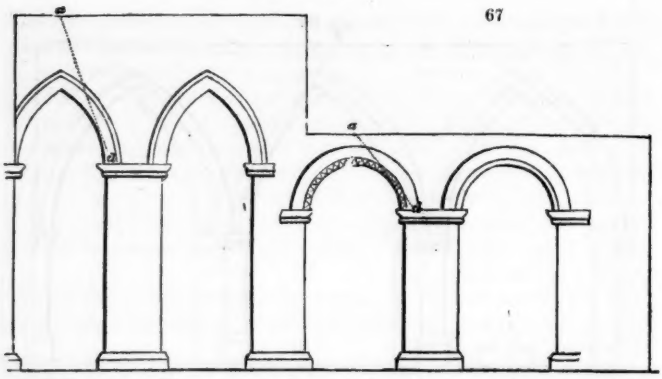
The particulars of the pointed arches and their pillars are as follows: — The span between the piers is 8 ft. 9 in. The height of the piers is 19 ft. 6 in. The height of the shaft is 17 ft. The diameter of the piers, which are circular, is 5 ft. The height of the masonry above the arches is 7 ft.

In 8 ft. 9 in. there are 105 in., which, divided by 6, gives $17\frac{1}{2}$ in. for the true diameter of the piers: their diameter, however, is 5 ft., or 60 in. Now, $17\frac{1}{2}$ taken from 60 leaves $42\frac{1}{2}$; and, since 2 in. in diameter equals 1 ft. in height, to preserve the balancing proportion, the $42\frac{1}{2}$ in. will give 21 ft. 1 in. more to the height of the piers above the span. Or, 8 ft. 9 in. added to 21 ft. 1 in. equals 29 ft. 10 in. for the balancing height: but the height of the pier is 19 ft. 6 in.; therefore, these may be allowed to be within the balancing dimensions by one third of their true height.

These arches and piers were submitted to experiment by a model; and the result was, that a single arch and pier balanced under one third of the weight of its pier, the masonry above the arch being entirely omitted.

The dotted line *a d* falls on the inside edge of the pier at the point *d*.

The particulars of the Saxon arches and piers (*fig.* 67.) are



as follows: — The span between the piers is 9 ft. 6 in. The height of the piers is 15 ft. 3 in. The height of the shaft is 13 ft. The diameter of the piers, which are circular, is 5 ft. The height of the masonry above the arches is 2½ ft.

In 9 ft. 6 in. there are 114 in., which, divided by 6, gives 19 in. for the true diameter of the piers: but the diameter of these piers is 5 ft., or 60 in. Now, 19 taken from 60 leaves 41 in., which, as it has been before observed, equals 20½ ft., and, when added to the span of 9 ft. 6 in., makes the balancing height 30 ft.

According to the experiments relative to figs. 149. and 150., Vol. III. p. 410., the pillar of fig. 150. is one fourth less than the pillar of fig. 149.; therefore, the pillar of the Saxon arch should be reduced from 30 ft. to 22½ ft. high. But these pillars are 15 ft. 3 in. high; consequently, they are one third less than their true height, and corresponding, in this respect, with the Norman pillars.

When these arches and piers were submitted to the test of experiment, a single arch and pier balanced under the weight of nearly one half of its pier, the masonry above being omitted. Here is another example of agreement between the Norman and Saxon arches and pillars, which proves the correctness of their respective proportions, and that the strength of both is equal.

The dotted straight line *a d* falls a small distance from the inside edge of the pier, at the point *d*.

In consequence of the result of the experiments relative to figs. 153. and 154., Vol. III. p. 413., a doubt arose as to the truth of 29 ft. 10 in., or say 30 ft., being the balancing height of the Norman pillar, or pier, and arch. To determine this point, the model of the pier employed was 6 in. square at the base, and 36 in. for the balancing height; because 5 ft. in 30 ft. goes six times. The arch composed of voussoirs only, when placed on

this pillar, balanced with 5 lb. on the crown; therefore, proving the balancing height to be far above 36 in., it being, indeed, 96 in., and consequently, in proportion, 30 ft.; the supposed balancing height of the Norman pillar is within the true height in the same proportion. The experiments relative to figs. 151, 152, 153, and 154., Vol. III. p. 411., confirm these remarks. Hence, the conclusion which may be drawn is, that the calculations made to preserve the true proportions between the diameter of a pillar, its height, and the span of the arch, are not correct when the diameter of a pillar becomes one third or one half of the span.

Of the Arches and Pillars belonging to the Chapel on the North Side of the Choir of Rochester Cathedral.—The particulars are as follows (*fig.* 68.):—

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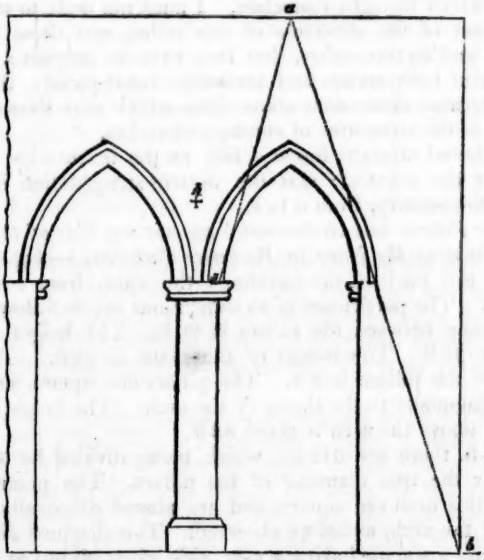


The span between the pillar and pier is 10 ft. The height of the pillar is 18 ft. The height of the shaft is 15 ft. 6 in. The diameter of the pillar, which is circular, is 3 ft. The height of the masonry above the arches, taken from the intrados, is 10 ft.: above this there are other arches, &c.

In 10 ft. there are 120 in., which, divided by 6, gives 20 in. for the true diameter of the pillar; but it is 3 ft. in diameter, or 36 in., and therefore 16 in. beyond the true diameter. These 16 in. will allow 8 ft. to be added to the span for the height of

the pillar, which, therefore, should be 18 ft. The height, however is 18 ft. 6 in., and, consequently, only 6 in. over the true dimensions.

It has been shown, when treating of the Norman and Saxon arches and pillars, that, when the diameter of a pillar is greater than one sixth of the span, the balancing height is above that which the usual calculations admit of; therefore, in this instance, it exceeds the proportion of six times the diameter.

Now, as 3 is to 10, so is 4 to 13. On looking at the experiment relative to fig. 151., Vol. III. p. 411., the base of the pillar is 4 in. square, and it balanced the pointed arch on 32 in. in height, or eight times the diameter. Since this experiment is the nearest of any of the other experiments to the proportions of the arches and pillars under consideration, the balancing height of this pillar and arches may be fixed not far from the point *h*, which is eight diameters. I must not omit to state, in justification of the stoutness of this pillar, and those of the Norman and Saxon arches, that they have to support a superstructure of both arches and masonry; consequently, they require increased dimensions above those which were shown to be adopted in the structures of common churches.

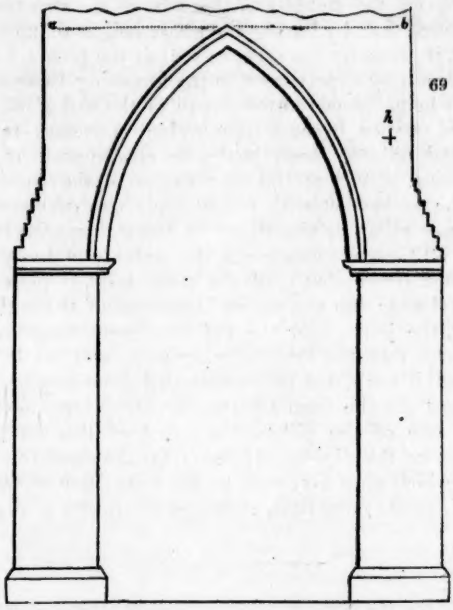
The dotted straight line *a d* falls on the inside edge of the pillar, at the point *d;* and the dotted straight line *a b* lies within the masonry, from *a* to *b*.

Of the Pillars and Arches which support one Side of the great Tower fronting the Nave in Rochester Cathedral.—*Fig.* 69. represents this part of the building: the width from *a* to *b* is assumed. The particulars of its dimensions are as follows:—

The span between the pillars is 26 ft. The height of the pillars is 32 ft. The height of the shafts is 28 ft. The diameter of the pillars is 8 ft. The pillars are square, and one placed diagonally to the thrust of the arch. The height of the masonry above the arch is about 83 ft.

In 26 ft. there are 312 in., which, being divided by 6, gives 52 in. for the true diameter of the pillars. The pillars supporting this arch are square, and are placed diagonally to the thrust of the arch, as before observed. This diagonal diameter is 8 ft., and a square having a 4-in. side gives $5\frac{1}{2}$ in., or a trifle more, for the diagonal diameter; therefore, with this proportion, the square to the 8 ft. diagonal is readily found. For 4 is to $5\frac{1}{2}$ as 8 halves are to 11 halves: again, 11 is to 8 as 8 is to 5 ft. 10 in., the square required.

Now, 5 ft. 10 in. contain 70 in., which is 18 in. above 52, the true diameter; and will therefore allow 9 ft. to be added to the height of the pillars above the span, making the true height 35 ft., or six times 5 ft. 10 in.: but the pillars are 32 ft., therefore 3 ft. short of the balancing proportion; and they are con-



sidered with their square sides to the thrust of the arch. They, however, are placed diagonally; and, according to experiment, the balancing point is raised, in consequence, up to the point *h*, which is one fourth higher than the square side admits of. The experiment was conducted as follows, the scale being 1 in. to a foot:—

As 5 ft. 10 in., or 6 ft. (the diameter), are to 26 ft. (the span), so are 4 in. (diameter) to 17 in. (span), which is nearly enough.

Now, 35 ft. is the balancing height of the pillars under this arch, which supports one side of the tower of this cathedral; and 4 multiplied by 6 gives 24 in. for the balancing height under the arch of 17 in. span between the pillars, the arch being 16 in. span. The experiment confirmed this; for a 17-in. span, between the pillars of 24 in. in height, just balanced a Gothic arch of 16 in. span, when the pillars stood square with the thrust of the arch; and upon turning these pillars from the square to the diagonal, with the thrust of the arch, they just balanced when they were raised 6 in. higher, or from 24 in. to 30 in., which is one fourth above the original height of 24 in.

The pillars and arch of this one side of the tower have to support a height of masonry above the arch equal to 83 ft.; the total height of the tower, according to *Hasted*, being 136ft.

As respects the stability of this part of the structure, it may be observed, that, by having the above height of masonry over the arch, it preserves the arch, as well as the pillars, from flying out, as shown by experiments in the foregoing Essays. Again, the tower being placed in the centre of the cathedral, the cross walls and arches become immovable buttresses to its four arches and pillars. And, lastly, in consequence of the four pillars being placed at the four angles of the square of the tower, the arches act with considerably less overturning force against each pillar, as also shown by former experiments.

From all these circumstances, the stability of the pillars and arches, and, consequently, of the tower itself, is placed beyond the least doubt: but yet, on an inspection of the arch fronting the nave, the joints near the keystone have somewhat opened. This proves that the arch is giving way; and, as it has been shown that it could not have proceeded from any lateral yielding, it must then be from a perpendicular sinking in the foundation of one of the pillars. An evil of this kind is often occasioned by the digging of graves for the dead in our sacred temples, which must ever tend to the destruction of these buildings, and, at the same time, endanger the health of the living.

ART. IV. *On the Necessity of connecting Buildings in the Country, and especially Dwelling-houses, with the surrounding Scenery, by Means of Architectural Embellishments.* By SELIM.

THE effect of many handsome houses in the country is entirely spoiled by the want of architectural embellishments around them. Every man of taste must be sensible that a fine architectural composition loses half its beauty when it has nothing near it to harmonise with the building, and unite it to the surrounding scenery; and even a palace has a cold and forlorn appearance, however splendid the building may be in itself, when it stands alone upon a bare expanse of turf. To the picturesque eye there is a something wanting; a frame, if I may so speak, to set off the picture to advantage. Painters, I believe, attach a good deal of importance to a frame, and are unwilling to exhibit their works without one. Why should not an architect insist upon a similar privilege for his works, and be allowed to frame them with such objects as will show them off to the best advantage? No professor of the sister art would allow an inferior hand to finish off the foreground of his picture: why, then, should the architect? I believe modern architects are generally acquainted with the principles of landscape-gardening, and they certainly should claim the privilege of designing the embellish-

ments which are to surround the building, and of laying out the ground near it.

My thoughts have been frequently led to this subject, when I have visited modern houses which have obtained some celebrity in their neighbourhood. Generally speaking, the first impression produced upon my mind has been a feeling of disappointment; arising, in part, from having heard the place overpraised by persons who have had no knowledge of architecture, and no feeling for what is called the picturesque. But, very commonly, there is a just reason for disappointment. The building itself may be a beautiful and striking object; but it does not connect itself with any thing around it. In short, there is no picture; though, perhaps, a very little additional expense and trouble would have united the house with the surrounding scenery, so as to present altogether a beautiful composition. To illustrate my meaning by an example, I may instance a place in my own neighbourhood, which has many advantages of situation, and is considered hereabout as a pattern for a wealthy country gentleman's residence. The house is large and handsome, and consists of a centre and two wings, something in the form of *fig.* 70.; in which *a* is the house; *b b*, the offices; and *c c*, the proposed architectural gardens. It has a fine portico of four columns in the front. It stands on the south side of a beau-

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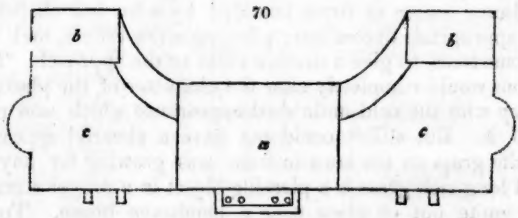

tiful vale, on a gentle eminence, in a well-wooded small park. Behind it, at a short distance, is a steep bank of wood, and in front is a rich confined view over the park, and some beautiful meadows, with a stream winding through them, to another woody bank on the opposite side of the vale; the church and cottages at a distance, and other pleasing objects, combining to form a very delightful landscape, when viewed from the house. When I went to see it, we approached the mansion through a fine hanging wood, which bounds the park on one side; and, coming suddenly upon it, with highly raised expectations, I met my old friend, disappointment; for, with all its natural beauties, nothing could be more uninteresting than the general effect. We found the grass in the park growing for hay, and 1½ ft. high

even on the lawn in front. A road, just wide enough to allow a carriage to pass along, led up to the magnificent portico; but, to turn the carriage round, it was necessary to drive into the long grass, or into the court behind the house. At one end, before some of the principal rooms, a small square of grass was close mown, at the other end it was growing for hay; and on a row of broken hurdles, joining one of the wings, some stable-cloths were hung out to dry. These last, though quite out of keeping, were the only picturesque objects visible; for there was neither shrub nor flower, nor vestige of architectural ornament, to enliven the scene; and, though the day was lovely, and the distant objects beautiful, it struck me as one of the dullest-looking residences I had ever beheld. Now, this gloomy effect might be remedied with little expense or trouble, and, probably, would have been, had the architect laid out the ground adjoining the house. I conceive he would, at least, have enclosed with a low balustraded wall, the two spaces at the ends of the principal building as far as the wings extend; placing on the wall, at proper intervals, a few handsome vases, and breaking the line of it with ornamental gateways or stone seats. Within the walls would have been gardens, containing flowers and shrubs, vases and statues, and, perhaps, a fountain in the centre of each. Instead of the present miserable road, which makes the massive portico look almost ridiculous, he would have formed a handsome sweep in front, bounded by a few low obelisks, or other appropriate decoration; planting a few cedars, and other handsome trees, to give a dressed effect to the approach. These additions would completely alter the character of the place, and do away with the cold unfinished appearance which now reigns around it. But still it could not have a cheerful appearance while the grass on the lawn in front was growing for hay. A field of long rich grass is a pleasing object in a proper situation, but is quite out of place near a handsome house. To me, there is something gloomy in the appearance of a large expanse of waving long grass: it also seems to raise the surface on which it grows, and to make every thing around appear smaller than it really is; and, as you know it is forbidden ground, it creates an unpleasant impression of confinement. The space about a handsome dwelling should be free and open, and be kept closely grazed by cattle, sheep, and deer, to give life and cheerfulness to the scene. There is nothing that contributes more to the cheerfulness of a country residence than large herds of animals, apparently enjoying a happy state of freedom within the wide range of a park; and a park without animals would be almost as cheerless as a large city without inhabitants.

Wiltshire, June, 1837.

ART. V. *Liverpool Medical Institution; designed by C. Rampling, Architect.* Communicated by CHARLES COXON.

THE accompanying plans and elevation (*figs.* 71, 72, and 73.) of this Institution were approved by the Finance Committee of the Common Council on the 14th of August, 1835. The building is now in the course of erection. The drawings, I think, are worthy of a place in your Magazine; and I shall be happy should you coincide with me in this opinion.

Fig. 71. is the front elevation.

Fig. 72. is the ground plan, in which *a* is the hall, 35 ft. by 18 ft.; *b*, the library, 40 ft. by 24 ft.; *c*, office; *d*, committee-room, 24 ft. by 21 ft.; *e*, lecture-room, 40 ft. by 31 ft.; *f*, stage; *g*, depot; *h*, passage; *i*, area; *k*, area; *l*, ashes; *m m*, vacant land; *n*, Hope Street; *o*, Mount Street.

Fig. 73. is the upper plan, in which *p* is the upper part of the lecture-room; *q*, museum, 25 ft. by 24 ft.; *r*, museum,

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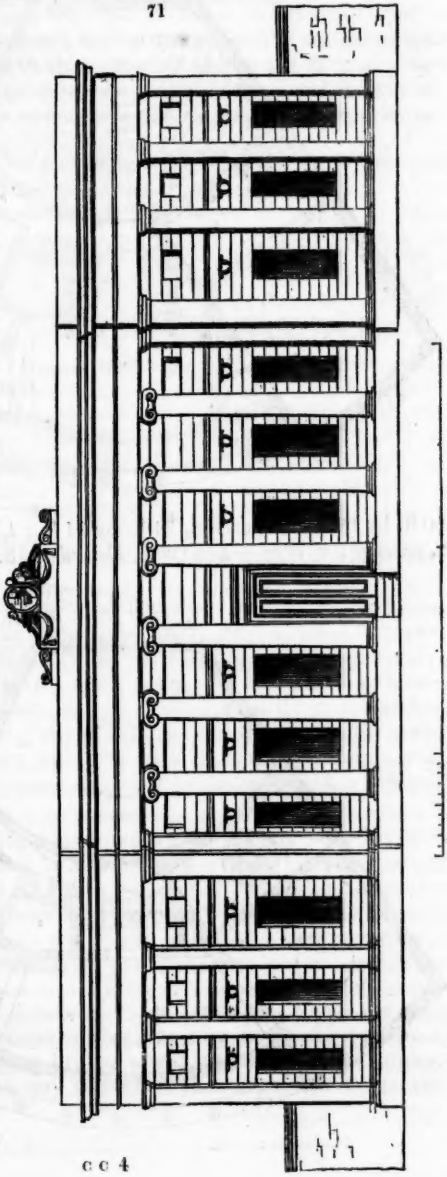

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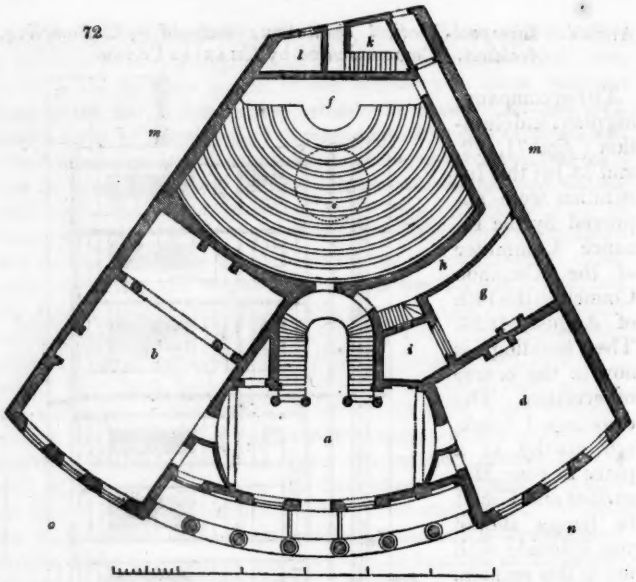

40 ft. by 18 ft. *s*, museum, 24 ft. by 21 ft.; *t*, preparation room; *u*, passage; *v*, area.—*Liverpool, December* 18. 1836.

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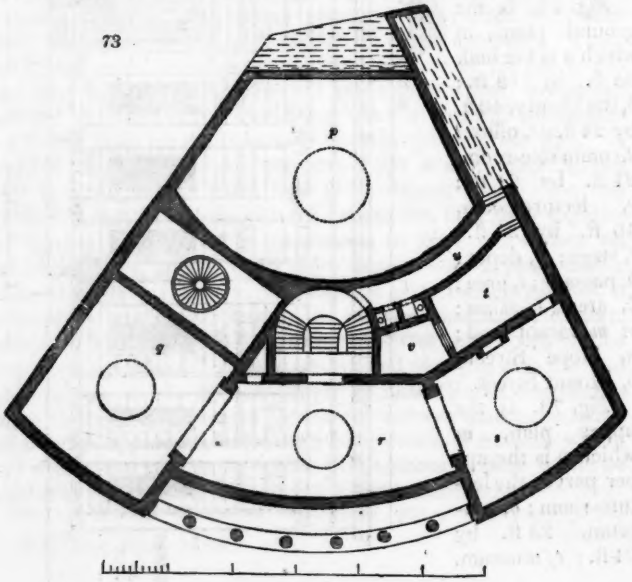

ART. VI. *Compensation Suspension Bridge.* By JOHN PRIDEAUX, Member of the Plymouth Institution.

HAVING lately made a visit to Switzerland, I noticed some bridges at Geneva, with the system of suspension (if it may be so termed) beneath the roadway, as (in *fig.* 74.), and formed of bar iron, in a curve approaching the catenary, and supporting

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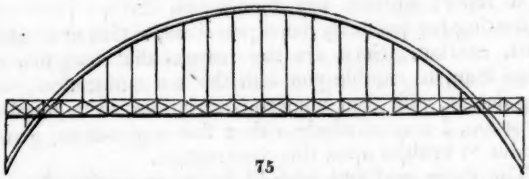
the bridge upon stiff bars. These bridges reminded me of some constructed on a sort of converse principle, by Mr. Leather of Leeds; which are described and figured in the *Companion to the British Almanack*, 1833, p. 222—224., and *fig.* 75., wherein



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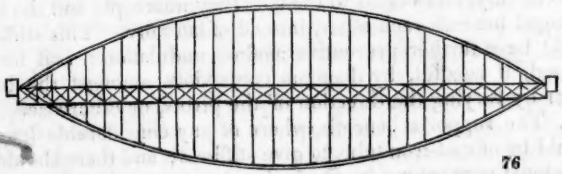
the system of suspension is an arch of cast iron, thrown across above the bridge.

A combination of the two immediately suggested itself, as probably applicable in some cases, where good holding or abutment may be difficult to obtain. A suspension bridge is rarely erected, unless on a very small scale, with less than four catenaries, two on each side; and if, instead of such two catenaries (or arches), we employ one of each, locked together at the ends (*fig.* 76.), the catenary will form an abutment for the arch, and the arch a stay, or anchorage, for the catenary: as it is evident



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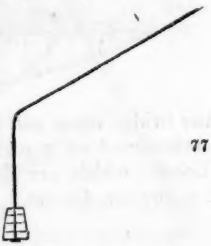
that the weight, or pressure, which tends to expand the one, will also tend to collapse the other; thus establishing mutual compensation. Such a bridge would, therefore, stand without lateral support, upon any basis firm enough to bear its vertical pressure.

So many suspension piers and bridges have given way, by undulations, oscillations, sudden local strains, or other causes, that room appears, if not for improvement in the general principles, at least for local and circumstantial adaptations. Even the magnificent bridge at Freybourg, has been rumoured to discontinue the passage of heavy waggons, in consequence of symptoms of yielding having been perceived in the soft sandstone, at the bend of the stay, after entering the ground (see *fig.* 77.); a principle of anchorage which I understand to be common in suspension bridges of French construction. I was at Freybourg in September last; and, although certainly no prohibition reached my ear respecting the carriages permitted to traverse the bridge, yet, as there seems no reason for raising such a report without any foundation, some fretting has probably been perceived, sufficient to awaken, at least, caution. Such are the reasons that lead me, not a practical man, to trouble you with this communication; which, leaving details, with their numerous variations, to be supplied on the occasion, I may conclude with a few suggestions, generally applicable to bridges upon this construction.



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1. The curve and arch should be so proportioned as pretty nearly to compensate the different rates of expansion of cast and wrought iron; by which the roadway would always preserve pretty nearly its level; the expansion of the vertical rods, here, counteracting that of the main supports.

2. The rigidity of the arches would prevent any considerable undulation, and would require some corresponding stiffness in the catenary; as, if that were to bend much in the passing of a heavy load, too much strain would fall on the arch. To produce such stiffness, where the length is too great for single bars, the joints should be made not to coincide; the pivots should be set vertically, and bolted to the bars they intercept; and the bars arranged beneath each other, instead of laterally. This stiffness would be a further preventive against undulation; and be increased, if needful, by diagonal connexions amongst the bars, either by varying the direction of the pivots, or otherwise.

3. The supports beneath, where of any considerable length, should be of cast-iron tube, to give stiffness; and there should be occasional connexions, by St. Andrew's crosses, also of cast-iron tube, between those of the opposite side and the bearing-beams of the bridge. This would give steadiness, and prevent much horizontal oscillation; which would be further obviated by setting the supporting arches and catenaries wider apart at the ends

than the breadth of the roadway, as is done at Freybourg, with full effect.

4. It is in soft banks, and on successive piers in wide sandy water-beds, that this construction occurs to me as chiefly applicable; and in lengths of suspension not exceeding 250 ft., until experience may have shown that an upright supporter, as above described, may be trusted above 16 ft. long, without undue weight and expense of iron.

Plymouth, Jan. 6. 1837.

ART. VII. *Description of an easy Method of whitewashing or colouring the Fronts of large Buildings, in use on the Continent.* By JOHN ISAAC HAWKINS.

I HAVE often admired, in Belgium, Holland, and Germany, the convenient method which is employed in these countries for reaching every part of the front or side of a very high house, for whitewashing or colouring it, by one long ladder.

I have for years past mentioned the plan to several architects and builders in London, who have expressed their approbation; but I have not yet heard of its being put into practice in this country.

Being strongly impressed with the importance of the method employed, both in an economical and a humane point of view, I send you a sketch, whence may be seen, at a glance, the facility with which a man can command the greater part of the front of a house, at one station of the ladder, without having to go down. He is never tempted to reach to a dangerous distance, as he is apt to do when the ladder leans against the house, to save himself the labour of going down to remove the ladder to a new station, or to exchange it for a longer or a shorter one.

It is obvious, from the sketch *fig.* 78., that the plane of the ladder is, in all positions, at right angles to the plane of the house. To effect which, the end of a long pole is projected 4 or 5 feet from the highest window, the inner end being firmly secured to the floor, or braced down from the ceiling.

A pair of pulley-blocks, with a long fall-rope, are tied to the pole, and to the ladder, near the upper end, so that the side of the latter shall be, in all parts and positions, about 3 ft. from the surface to be whitewashed or coloured; and the fall of the rope is made fast to the ladder, as shown in the sketch.

3 ft. being about the length of a man's arm and a hand-brush together, he will conveniently reach the wall, without leaning from his perpendicular standing on the ladder.

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Under this arrangement, the man, while on the ladder, can pull it up, or let it down, at pleasure; and thus he has command of the greater part of the front or side of the house from one station of the ladder; and, by moving the foot of the ladder once or twice, he may reach at ease the whole surface.

A single man can raise such a ladder, 50 ft. long, without an assistant, and place it in all the positions necessary for him to whitewash or colour, with an ordinary hand brush, the whole front of the highest house; and such whitewashing or colouring will have a more uniform appearance than when performed by the English method, with long and short ladders, long and short handles to the brushes, to work at the various distances, which, notwithstanding the very numerous shiftings of the ladder, have necessarily to be reached. Hence a mottled appearance is so

often seen; for uniformity of laying on the wash is not practicable, while the short-handled brush is used at nearly right-angles to the wall, with the man's arm in the position of the greatest strength; and while the long-handled brush is employed at arm's length, in a very acute angle, and can be pressed against the wall only by strength of wrist.

I offer these remarks, in the hope that this notice may induce some, who are not afraid of going out of the beaten track, to adopt so valuable a mode of proceeding.

May 2. 1836.

ART. VIII. *Calculation of the Prime Cost Price of a Rod of Brickwork for a Railway Bridge in Kent.* By W. S., Surveyor.

	£	*s.*	*d.*
4200 stock bricks to a rod of work, at 31*s.* per thousand -	- 6	10	2
24 bushels of chalk lime, at 6*d.* per bushel - -	- 0	12	0
3 single loads of sand or road drift, at 2*s.* 6*d.* per load -	- 0	7	6
Labour - - - - - - - -	- 1	13	0
Allowance for use of scaffolding - - - - -	- 0	2	0
Total prime cost -	£9	4	8

The first price is made out in this way; — Supposing that four fifths of the bricks to be used are common sound stocks, at 30*s.* per thousand, and one fifth picked stocks, of an even colour, for the facings (which is a liberal allowance), at 35*s.* per thousand, including, in both cases, carriage.

	£	*s.*	*d.*
Four fifths at 30*s.* - - -	- 1	4	0
One fifth at 35*s.* - - -	- 0	7	0
	£1	11	0 per thousand.

In this calculation, I have assumed 4200 bricks to the rod; but the usual number in the average of works is about 4350. I think the former number, in this case, sufficient, as the piers, &c., are very massive, and so much waste does not take place in cutting to form the bond, &c., as in thinner walls.

The price of labour is calculated on the supposition that a man, with the assistance of a labourer, on an average, can lay 700 bricks per day.

$$4200 \div 6 = 700$$

On such works as railway bridges there are generally employed two classes of bricklayers; the most experienced man taking the

facing and making the work, and the inferior workman the filling in.

	£	s.	d.
6 days, at 3*s.* 6*d.* per day, being the average price of the two classes of bricklayers; the best class having 4*s.* per day, and the other class 3*s.*	-	1	1 0
Labourer, 6 days, at 2*s.* per day - - - - -	-	0	12 0
Total estimate of labour -	£1	13	0

The last item is a liberal allowance, because, where there are a number of men employed on works of this kind, the proportion of one labourer to every bricklayer is greater than is required, and, in many cases, machinery may be used to more advantage.

A bricklayer, with the assistance of a labourer, can lay 600 bricks per day, but here the filling in may be done at a quicker rate; I have taken 700; some men will lay from 900 to 1000 per day.

In London, the price of a rod of common work is from 36*s.* to 38*s.*, for all labour and use of scaffolding.

The work at Cloudesley Square Chapel was taken at 42*s.*, including the facings and cuttings to the splays and Gothic arches.

For the use of scaffolding, I have only allowed 2*s.* per rod, as not so much will be required as in houses, &c., in proportion to the number of rods of work.

The above calculations are made, presuming that the contractor would find enough clay in the cuttings for the bricks, and would consequently make them himself.

The following is the prime cost price of making bricks in Kent, without the addition of interest for the wear, tear, and cost of tools, expense of kiln, keep of mill-horse, &c.

	£	s.	d.	
Digging clay, attending mill, making bricks, attending kiln, stacking and *all other labour*, ready for delivery - - - -	-	0	10	0 per thousand
2000 faggots, at 3*s.* 6*d.* per thousand -	-	0	7	0
Carriage of ditto - - - - -	-	0	2	0
	£	0	19	0

In burning bricks in a kiln, a great quantity of chalk may be burned at the same time, without increasing the expense.

Tunbridge, December, 1836.

REVIEWS.

ART. I. *Temples, Ancient and Modern; or, Notes on Church Architecture.* By William Bardwell, Architect. 8vo, 234 pages, Plates.

IN the Preface, the author states his object to be, "to excite among architects a spirit of enquiry, such as cannot fail to prevent a repetition of those improprieties, the existence of which in our public edifices has so long afforded subject for complaints, and matter for criticism."

"I would put an end to that inconsistency which is the cause of error; the tyranny of custom, and the caprice of fashion; which, while they compel the modern architect to copy *in little*, and with meaner materials, the sublime works of revered antiquity, indulge a laugh at his expense, because his reproduction fails to excite those sensations of pleasure and admiration which are inseparable from the contemplation of the original. The architects of our modern churches are, in general, induced to adopt the pointed style of architecture; while the material in which they are compelled to work was wholly rejected by their great predecessors in the middle ages. The pointed style of architecture, its character, its beauties, and even its faults, are essentially those of construction in stone: had that substance been wanting, the style would not have existed; and a candid consideration of the criticisms I have collected will, I think, make it clear that the chief defects of modern imitation arise, not so much from a want of acquaintance with the style, as from the necessity of adapting it to the littleness and poverty of a brick construction. In all the great examples of the middle ages, stone alone is used: had brick been adopted, we have every reason to believe that the artists of those days would have adapted their style to its peculiarities, as they did to those of stone. The royal robes of a monarch are grand and dignified, when purple and fine linen are their fabric; but let their form be imitated in paper and tinsel, and they excite only contempt and derision. The effect of a building owes much more to its material than is generally imagined: but this is too often overlooked, or mistakingly regarded as a matter of indifference, while the style engrosses the deeper attention of the architect. The superiority of the city churches over those recently erected is attributable mainly to the component substances of which they are constructed; and, as one result of my investigation, I may observe, in connexion with these edifices, that, notwithstanding his errors of detail, the general style and the materials of Sir Christopher Wren are almost the perfection of Protestant church building.

"If, then, we be too poor to afford erections of stone, is it necessary, is it fitting, that we should continue to caricature the sublime conceptions of our ancient ecclesiastical architects, by imitating their works in a material which they rejected as unworthy to embody them? Let us, till better days arrive, till the public mind is more enlightened, and the public eye more instructed, practise in the Italian style, in which buildings may be constructed of almost any material, and which, with the strictest propriety, will bear the utmost extent of enrichment, and will preserve all the *pittoresco* of the Gothic, even when executed with a Quaker-like plainness. The great advantage, therefore, of this style is, that, small as may be the sum appropriated, a church may be erected for that sum; which, while it humbly answers the purposes of the building, may also do honour to the architect. But to compose the Italian style will certainly require a knowledge of the principles of design, in order to effect anything like a harmonious arrangement; and it would put a stop to the practice of going to Stuart's *Athens* for a portico, and applying it, no

matter how, and no matter where; a practice in reference to which the late Sir John Soane observed to me, some years since, 'My footman is as good an architect as I am.'

"In order to point out the principles on which is founded a just and correct taste in church architecture, I have thought it right to trace them as they rise, in a historical examination of the temples of all ages and countries. It is by such an examination only that we can discover the general principles of architectural composition, on which the effect of those buildings depends.

"If it be thought that I have in some instances recommended a style and class of edifices too expensive for our age, let the utilitarian be reminded that money expended in public buildings is not an outlay on the part of a country, but a most useful and economical application of the national resources. Some conception may be formed of the vast sums expended on the embellishments of ancient Athens, under the suggestion of that true political economist, the illustrious Pericles, when it is stated, that the cost of the Parthenon alone is computed at a hundred talents of gold; although, from the multitude of slaves, manual labour was at a low price, and the materials were the produce of the country.

"Attica was not impoverished by these sacrifices; nor would England, if a part of her enormous capital were similarly employed. The lowest class of the people would benefit directly by the sweet rewards of labour; and the splendour of her works of art would make the poorest son of the soil proud of the country they adorned.

"The early chapters of this work were written, as the reader will readily perceive from the tone and matter, before the Chancellor of the Exchequer had explained to Parliament the ministerial measure on the subject of church rates. No allusion, therefore, to that measure could have been intended by the author: with him the question was between church rates and no provision for the church." (p. xii.)

From this last passage, respecting church rates and no provision for the church, we were prepared in some measure for political and religious discussion; though it was not till after glancing over the whole of the volume, that we arrived at the conclusion that a considerable part of it cannot be considered as architectural. In proof of what we assert, we give the following quotation from Chap. II.: —

"Attacks have, from time to time, been made upon the established church of this country, and upon the religion of which it is the guardian, as an easy and safe mode of obtaining political notoriety; for, invented or exaggerated statements against the lives of the clergy, their wealth, their pride, or their indolence, are always eagerly received by a greedy and eager populace; and, strange to say, their author is lauded to the skies as a patriot.

"These attacks are so diversified in their origin, and so hollow in themselves, that I will not fatigue the reader with an attempt to enumerate or classify them. The source from which the church derives its property is constantly misstated, the amount of that property grossly exaggerated, and a new application often urged, under the specious pretext of popular relief. Thus, for instance, it is sometimes stated that church property was given, or bequeathed, for the sake of procuring masses for the souls of the donors. This is a great mistake: the lands left for that purpose were the Chantry lands, none of which are now in the hands of the church: one of the first acts of Edward the Sixth's reign was to impropriate them to the crown. But the delusion about the wealth of the church is fast passing away; the late Parlia-

mentary returns, and the writings of many able men who have examined the subject, have, in some degree, opened the eyes of the people to the deceptions of their misleaders; and that man must be besotted and ignorant indeed who now believes that the church of England is a wealthy establishment; and that our present estimable primate has fifty thousand pounds a year, or even a third part of that sum.

"I shall show in the succeeding chapter some of the uses to which the wealthier clergy have applied the means of doing good committed to their hands; and the public evil that will follow the efforts of innovators to remove them, or restrain their exertions, by limiting their incomes. The Tithe Commutation Bill of last session has, at least for the moment, silenced the unreasonable cry for the abolition of tithes; but, should it be renewed, it will be well to remember, that a simple repeal of tithes would only be a simple addition to the rental of the landlords; and what benefit would result to the people from a mere robbery of themselves? The landed proprietors should also recollect, that, if once they sanction the principle of interference with the most ancient title to property in the realm, they, in fact, acknowledge that rights and titles are dependent upon the public will; therefore, the legal owners may be stripped of them whenever public clamour requires it." (p. 16.)

"Nothing can be more dishonest than the conduct of those persons who refuse to pay church rates; a tax to which their property has been subjected for many hundred years before they or their fathers became possessed of it, and on account of which they obtained that property at so much the less cost, because it was charged with the duty of keeping up the parochial edifice: but this duty they are now endeavouring to transfer to other property, which has never borne it; for, in spite of infidelity, the churches must be kept up. In short, it is a mere question of property, and not of person; and a man may just as reasonably refuse to pay the interest money upon a mortgage over his estate, or the King's taxes, or any other burden upon property, as the church rates, upon the specious pretext of its being against his principles." (p. 19.)

"Had we a property tax as the ancient Egyptians had, we might expect to rival their wonderful monuments, and see our country become its wealth, the product of its never-tiring industry would not then evaporate in foreign loans and absenteeism." (p. 202.) "We are the most hard-working people upon the face of the earth; and yet thousands of our poor are in want of the necessaries of life, — How is this? What becomes of the product of this immense exertion? It does not circulate here, or the result would be different. It goes out of the kingdom, and enriches other nations: and, were a tax imposed upon absentees to the amount of 50 per cent, that would not be an equivalent for the loss of the other 50." (p. 203.)

The work abounds in similar passages, and in others still more political; but there is intermixed with these a variety of curious and useful matter, and the work is illustrated with beautiful engravings, some of which, however, have already appeared in the *Graphic Illustrator*, and in other works.

ART. II. *Observations on the Architecture of England during the Reigns of Queen Elizabeth and King James I.* By C. J. Richardson, Architect. The Sixth and concluding Part. 4to, plates.

THE wrapper of this work states it to be the sixth and concluding part, while the letterpress contains Chap. I. p. 1., and is continued to p. 32. Be that as it may, it contains seven beautifully lithographed plates of Claverton, in Somersetshrie,

and the Duke's House at Bradford, in Wiltshire. The latter is a splendid specimen of the Elizabethan architecture; and, judging from the exterior, we should prefer it to anything of the kind which we have seen. The house at Bradford belonged to the Duke of Kingston, and is supposed to have been built from the designs of John of Padua. Aubrey describes it as "the best house for the quality of a gentleman in Wiltshire. It is the best sort of architecture of King James I.'s time. It is built entirely of freestone, full of windows, and has two wings; two, if not three, elevations or ascents to it, which are adorned with terraces, having either rails or stone balustrades. The house is now occupied as a farm-house." (p. 21.)

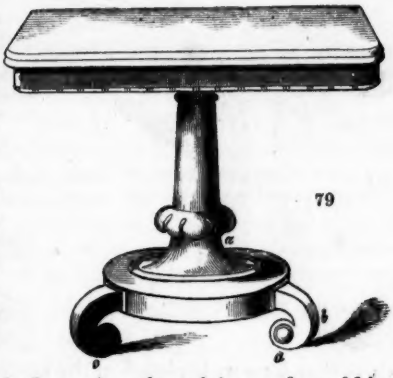
ART. III. *Plans and Elevations of the proposed Restorations and Additions to the Cathedral of Glasgow.* With an explanatory Address by the Local Committee. Imperial folio, plates.

THE object of this work is to show how much the Cathedral of Glasgow would be improved in appearance by a new western front, and a new south transept. This is exhibited in some splendid lithographic plates, which have been prepared at the expense of a local committee, with the greatest care, by a professional gentleman of eminence and experience in Gothic architecture. The general character of the additions is, as respects splendour and architectural details, in strict character with the finest parts of the ancient building; all the mouldings and other ornaments being taken from those exhibited in the choir and nave. We cannot but most ardently desire that so public-spirited an undertaking may be crowned with success; not only for the sake of our native city of Glasgow, but on account of setting an example which, we trust, will be followed by other towns of Scotland, where the hands of our barbarian ancestors dilapidated so many fine ecclesiastical edifices.

ART. IV. *The Cabinet-maker's Sketch-Book of plain and useful Designs.* Vol. II. *consisting of Cabinet-work generally.* By T. King. 4to, containing 36 plates, and 92 designs. London, 1836.

WE expressed our favourable opinion of the first volume of this work in Vol. II. p. 512.; we may observe, generally, that this volume rather excels, than falls short, of the former one. We shall copy a few of the designs from it, which we consider as good; and some portions of others, to exhibit what we consider defects or faults, though these are not numerous. Not a few of the designs resemble those published in our *Encyclopædia of Cottage and Villa Architecture and Furniture;* the reason,

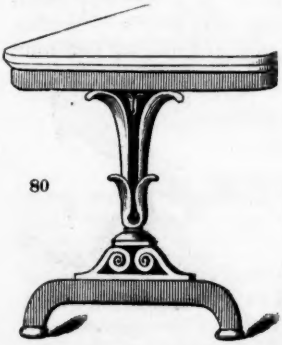
doubtless, being, that both have been obtained from the same source; viz. the portfolios or warehouses of the principal London manufacturers.

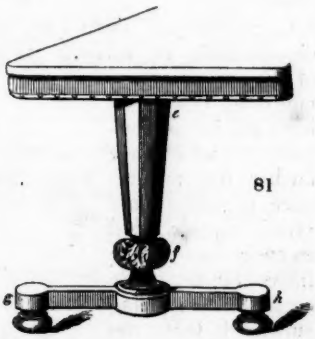


79

The support to the card-table (*fig.* 79.), taken from Mr. King's plate 25., strikes us as having a good effect, from the concave curve at *a*, as contrasted with the convex curve at *b*. The scroll foot, as exhibited at *c*, is rather plain; and would be improved, as it appears to us, by some such addition as we have shown at *d*.

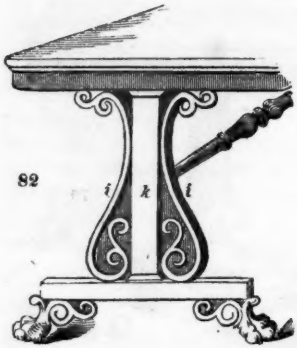
Fig. 80. (from plate 26.) is a portion of what is called an occasional table, in which the supports are made in the form of a flower. This, we are decidedly of opinion, is in bad taste; because it is not in analogy with what takes place in nature. Flowers are exceedingly good ornaments to supports, as they are also to the capitals of columns; but it is repugnant to correct feeling and reasoning to employ them as principals. See what we have said on the subject of ornament relatively to use, in Vol. III. p. 311.


80



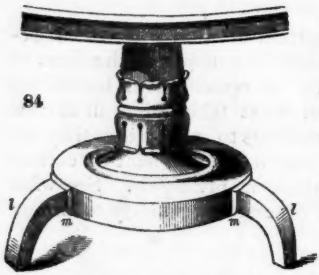
81

Fig. 81. (taken from plate 26.) is objectionable, on account of the bad finish which the polygonal leg makes at *e*. The neck at *f* is, perhaps, rather too small for that leg; but the lower part of the foot, from *g* to *h*, appears to us good. A polygonal or round finish to the top of a support to a table is allowable,

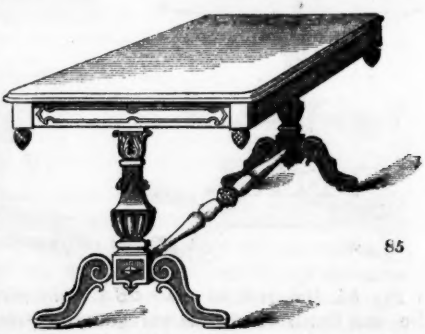


where that support is placed in the centre; but not, as we think, where that support is placed at the side or ends, as in *fig.* 81.

Figs. 82. and 83. (also taken from plate 26.), and more particularly the latter, appear to us very good. The columnal support of *fig.* 83. finishes well, both at bottom and top; and, in *fig.* 82., the scroll ornaments (*i i*) are very legitimately employed to decorate the pillar (*k*).



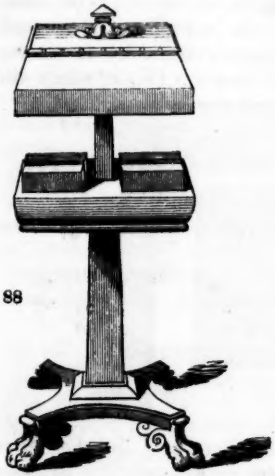
Four designs for loo tables are given in plates 27. and 28. Three of them are very handsome; but one of them (*fig.* 84., from plate 28.) is altogether objectionable, on account of the abrupt nakedness, and want of the appearance of cultivated design or high art, in the supports (*l l*), which have farther the appearance of being only glued on, and held in their places by the fillets (*m m*). We cannot help feeling surprised that the party who designed the upper part of this table, and of the other three very handsome tables, should have allowed these naked and common carpenter-like supports to escape his pencil.



86

87

Fig. 85. (from plate 29.) is an "occasional table," in the Elizabethan style, very handsome, and highly expressive of the most cultivated variety of that manner of design.



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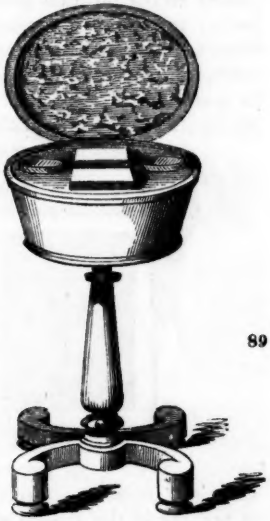
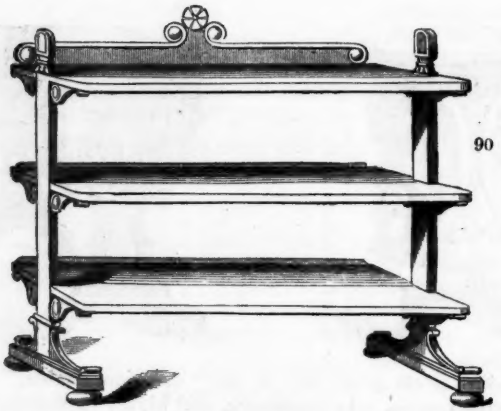


89

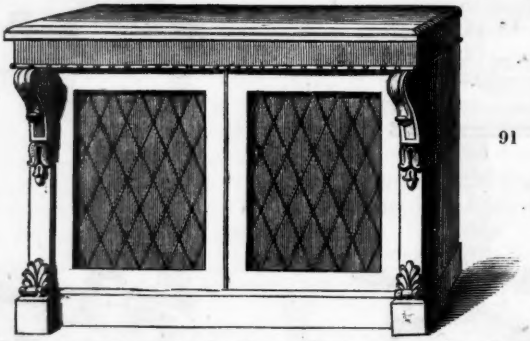
There are three other very elegant designs for tables in the same plate, and four beautiful ones in the succeeding one; but the Gothic feet of one design in plate 39., and another in plate 31., have too much undulation in their outline, and are, consequently, without spirit: they are also much too plain for the superstructure.

In the work-table, of which *fig.* 86. (from Mr. King's



90

plate 32.) is a portion, it is unsatisfactory to see an ornament (*n*) placed in the position generally occupied by the principal supports; while the principal supports (*o o*) occupy the place of what are usually ornaments. Of course, the principle of actual strength has very little to do with the expression of strength in instances of this kind; as becomes evident by inspecting *fig.* 87., a work-table in the style of Louis XIV., in which the



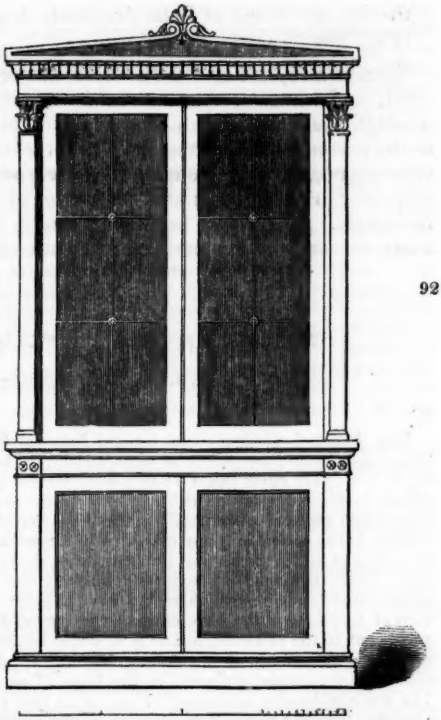
91

principal supports are in the form of ornaments; but then there is nothing in the design which creates an allusion to a stronger mode of support to contrast with them.

Figs. 88. and 89. (from plate 33.) are poys, or supported tea-chests; both handsome.

Plate 34. exhibits five beautiful fire-screens, with which we have not a single fault to find; and we may make the same observation with respect to the screens in plate 35., and the flower-stands and Devonports in plate 36.

Plates 37. to41. exhibit handsome sideboards, in different styles of design; and plate 42. shows two dinner waggons. The castors in *fig.* 90. (taken from Mr. King's plate 42.) are concealed in the balls which support the feet: but they are, or ought to be, such as to admit of readily rolling the waggon backwards and forwards, when it is loaded with glasses, decanters, plates, knives, and other articles required for the dining-table.



92

Plates 43. to 47. are sideboards; and plate 48. contains side-tables. Other plates, filled with commodes and pier slabs, carry us on to plate 55., which contains a handsome design for a bookcase, as do plates 56. and 57. respectively. Plate 58. exhibits two commodes; plate 59., an open bookcase; and plate 60., a wardrobe. We select *fig.* 91. (from plate 54.) as a handsome architectural commode, and *fig.* 92. (from plate 55.) as an architectural bookcase.

On the whole, there are many elegant and useful designs in this work, and we can strongly recommend it to the cabinet-maker and upholsterer. It contains no letterpress whatever, except a table of contents.

ART. V. *A Series of Plans for Labourers' Cottages, and other Habitations, constructed upon Economical Principles, and adapted to Town and Country Dwellings; engraved on Thirty Plates: with an Introduction, containing many useful Observations on this Class of Building, tending to the Comfort of the Poor, and the Advantage of the Builder; with Calculations of Expenses.* By

the late Mr. Wood of Bath, Architect. A new Edition, corrected to the present time. Folio.

THIS is a reprint of a work which was originally published in 1781, and which at that time did an immense deal of good. Though the estimates which it contains are not exactly suited to the present time, yet that is a matter of comparatively trifling consequence, because the quantities are given; and to these any carpenter or builder can affix the prices in the locality in which he resides. The work, we have no doubt, will be acceptable to many country builders and landed gentlemen.

MISCELLANEOUS INTELLIGENCE.

ART. I. *Domestic Notices.*

ENGLAND.

THE National Gallery. — As for the National Gallery, "the voice of artists, amateurs, and the public at large, speaks, we believe, but one opinion; we, at least, have never heard a single word uttered in favour of the building, either *per se*, or considered with reference to the magnificent position which it has been allowed to occupy." (*Quarterly Review*, No. 115. p. 79.) Mr. Wilkins is the author of many designs which command general approbation; but certainly he has been most unfortunate in the case of the National Gallery. There is a want of magnitude, which is one of the first elements of architectural beauty; next, there is a want of height; and, thirdly, there is a want of simplicity in the disposition of the general masses. An obvious improvement to the elevation, bad as it is, would be the removal of the cupolas at the two extrimeties of the building, and the removal of the two columns with their architraves, projected in the front of each of the two archways. The width of bearing of the architraves in the case of these last columns, as compared with the width of the bearing of the columns of the portico, is revolting to the sense of fitness; and independently altogether of considerations of this kind, these projections are objectionable as destroying the simplicity of the elevation, and consequently distracting the eye. A similar result is produced by the cupolas at the two extremities. In our opinion there is not a single point in this building which is even tolerable, excepting the portico. — *Cond.*

The Chapel Royal of King Henry VIII. *at St. James's Palace.* — This ancient place of worship, the first royal chapel in which the Protestant, or reformed doctrine of the Christian faith was preached before an English monarch, has been for some time undergoing a complete architectural alteration, if not a reformation, under the auspices of the Commissioners of Woods and Works, but directed by Sir Robert Smirke, R.A. The chapel is not large, being scarcely 30 ft. wide, by less than 50 ft. in length, and not more than 30 ft. to the ceiling. It was the original chapel of the Hospital of St. James; many other parts of which still remain engrafted with the less ancient works and modern additions of the palace. When Henry VIII. took possession of this institution, he had the chapel fitted up for his own use, and engaged Hans Holbein to paint the ceiling, which is in the most elegant taste of that day, each compartment having its peculiar armorial bearing, symbol, or allegorical device. Two of the divisions are remarkable for having the armorial bearings of two of the "tenacious disputant" queens, quartered with the arms of England These are towards the north-west corner of the ceiling, nearly over the altar:

the first is that of Anne of Cleves; the other, of Anna Bullein, or Boleyn: but neither Catherine of Arragon, Jane Seymour, Catherine Howard, or Catherine Parr, are noticed in any way in the building. The ceiling was completed in 1540, as we see by that date being repeated in several of the smaller compartments of the original work. Part of this ceiling having been destroyed or greatly injured, it was requisite to renew it in the exact taste of the original; and for this purpose Mr. C. J. Richardson was engaged to make the drawings and superintend the painting. The object appears to have been completely attained, as the new portion of the ceiling harmonises in style and colouring with the ancient part: but the tone is less sombre, because the work is new; yet a year or two will lower it sufficiently. Their Majesties' seat is at the southern end, exactly opposite to that in which is the communion table. On the right is the pew for the choristers; on the left, exactly opposite the latter, is the organ: there are no other gallery seats. The pews below are about twelve in number, and may hold about seventy persons. These pews are nicely carved in oak, in a suitable taste; but we cannot say so much for the cornice, which, instead of uniting the rich ceiling to the side walls, cuts off all union of style or taste between them; and so far there is a great want of harmony of parts; but, as the work is not finished, we hope this may still be remedied. The rich ceiling and bare walls can never be intended to remain in that discordant state; and some stained glass is required in the windows. (*Morning Herald*, April 21. 1837.)

CHESHIRE. — *Birkenhead.* Designs for a new church, to be built here, have been advertised for. It is to contain 800 at first, and to be capable of enlargement. — *J. K.*

Blackburne. — A church is about to be erected at Accrington, near this town, from designs, we are informed, prepared by Messrs. Williams and Edwards of Liverpool. — *Id.*

Chester. — The committee of the Mechanics' Institution have requested the city council to allow the use of the water tower. It is intended to have it put into thorough repair, which will cost about 220*l.*, and to fit it up as a museum of antiquities, and natural history. — *Id.*

Dutton. — *The Grand Junction Railway Viaduct.* This gigantic structure, across the valley of the Weaver, near this place, which is now near its completion, exceeds in magnitude anything of the kind yet accomplished in this country, or perhaps in Europe; not even excepting the splendid bridge over the Menai Straits. The viaduct is in the Gothic style, formed of red stone, procured from the neighbourhood of Bolton and Runcorn: it consists of 20 arches of 60 ft. span, and 60 ft. in height; and the battlements, when finished, will add 12 ft. more to the height: the whole length is 1400 ft. 700,000 square (? cubic) feet of stone have been used in its construction; and it will be completed in less than eighteen months from its commencement, and at an expense of 50,000*l.*, being considerably under the estimate. (*Liverpool Mercury*, Jan. 6.)

ESSEX. — A chaste and elegant chapel has lately been built on an eminence which commands a very fine view, called Buckhurst Hill, in the parish of Chigwell, near Epping. — *Frederick Lush. April*, 1837.

Haggerstone Church. — Originally the pulpit stood almost in a corner, against the front of the gallery; but now it has been removed, and placed midway between the two galleries; by which alteration the appearance of the interior is improved, and the voice of the preacher is the better heard by the congregation. — *Id.*

LANCASHIRE. — *Liverpool.* In Vol. III. p. 582., one of your correspondents, who signs himself W., informs your readers that the new Entrance to the Railway is nearly completed, and is a "chaste and elegant structure, in the Roman or Italian style." I had previously supposed the latter style was much more modern than, instead of being synonymous with, the Roman; that it succeeded the pointed; and that it was the same as that frequently called,

after its first cultivator, Palladian: but let that pass, as well as the suitableness of the Roman Corinthian style for a railway entrance. In this "chaste and elegant structure," where the line of front is broken by projections, columns, all of which in this building are engaged, are placed, round each of which the entablature returns on every side. The leaves in the caps appear as if they had been scraped, not cut, out of the stone; and look very tame. The shafts are worked plain. It is said that Mr. Weightman, who was Mr. Foster's managing clerk, perpetrated this design.

In his admiration for the design of the exterior, W. seems to have overlooked the magnificent shed in the yard, which is decidedly the best specimen of carpentry in this town.

W. also considers the Medical Institution (see fig. 71. p. 383.) as "chaste" in its design. In order to afford your readers an opportunity of judging of his correct taste in this particular, I would mention that in the Ionic columns the ovolo of the caps is worked plain, and not cut into eggs and tongues. The proportions of the building I do not like; as the centre, a recessed hexastyle portico, is about twice the width of the wings; which latter look very heavy, though considerably relieved by pannels.

In the new Custom-House, where the shafts are plain, the bases are eeded. The pilasters, about 4 ft. in diameter, project only 3 in., and are therefore invisible from a point where the whole building can be seen. The porticoes are about 50 ft. long, 30 ft. high, and project 9 ft. (These dimensions are not given from actual measurement.) The masonry is very bad. Each column is in about eight pieces; and the joints are so bad, that a crown piece may be inserted between them. The ashlar-work is in many places quite green.

In the Ionic portico of the Mechanics' Institution, now being erected under Mr. Picton's superintendence, from a design by Mr. A. H. Holme, the eyes of the volutes are worked flat, the shafts of the columns plain, and the bases reeded. W. says this building is expected to be finished in January. One of the committee, who takes a great interest in the affairs of the Institution, says it is not expected to be finished before July. I do not myself think it will be completed before May. The lecture room is intended to accommodate about 1200.

It is said that Mr. Jevons, having failed in establishing a joint-stock company for that purpose, intends building an arcade of shops, which, when completed, will much exceed in size the Burlington Arcade, London.

A joint-stock company is being formed here, for the purpose of building a music hall: nearly five hundred shares, of 25*l.* each, have been taken up.

Our common council intend applying for an act of Parliament, to enable them to erect a shire hall, to stand nearly opposite to that "chaste and elegant structure," the Railway Entrance.

Messrs. Cunningham and Holme are engaged in superintending the erection of a church, in the Norman style, at Aigworth. This is the only building in this style in this neighbourhood. An elegant church, at Knotty Ash, near this town, was completed about six months ago. It is in the perpendicular style, and was designed by Messrs. Williams and Edwards. For a building in the pointed style, the windows are not sufficiently embayed; and the shafts being sanded, present a striking contrast with the arches of the roof, which are of a pure white. Taken as a whole, it is, however, far superior to the generality of Liverpool buildings. The Marquess of Westminster is about to erect a lodge at Eaton Hall, near Chester. It is to be built of Bath stone, and is expected to cost about 20,000*l.*— *K. C. Dec.* 17. 1836.

St. George's Hall is a new building for oratorios, &c., for which about 25,000*l.* worth of shares have been subscribed. The Fish Hall is a building on the site of Sion Chapel, Murray Street, for the Liverpool Fish Company's sales, which is being erected from the designs and under the superintend-

ence of Mr. Rampling. The south front will be of stone, and will have, apparently, a portico of unfluted Doric columns in antæ. A very neat stone-fronted building, with a chaste Doric portico, is just completed for the Royal Institution Schools, from a design by your correspondent, Mr. Picton; and a Marine Observatory, in a convenient situation in the port, is about to be erected.— *Id. Jan.* 6. 1837.

NORTHUMBERLAND. — *Improvement of the River Tyne.* Engineers and others have often suggested plans for widening the harbour, that a greater quantity of the tidal water might be let in from the river Tyne. Mr. Cubitt has made an actual survey of the river, to propose such means as he deems best to carry it into effect; and has also had a dredging machine constructed for this purpose.— *F. Lush. London, April*, 1837.

SCOTLAND.

A new Glasgow Water Company has been projected, for supplying that city with water, upon the ancient principle of gravitation, in contradistinction to the ordinary one by pressure. The scheme has been devised, and the plan matured, by that singularly ingenious man, Robert Thom, Esq., of Ascog; and it has been reported on by John Thom, his brother, civil engineer at Greenock. A printed prospectus, of great length, may be obtained on application to David Murray, Esq., Secretary, 28. Miller Street, Glasgow.

ART. II. *Retrospective Criticism.*

SEPARATE Exhibitions of Architectural Designs. — I think the suggestion of Candidus in p. 301., recommending an exhibition of architectural designs, &c., under the *surveillance* of the Institute, of the greatest importance. It would not only be a very considerable means of acquiring knowledge to all, but would give unsuccessful architects, and the public, an opportunity of testing the capability, or impartiality, of committees in competition affairs; as there would be little expense in sending all returned designs to the exhibition. It would likewise prove a great encouragement to young architects, even though the prize were praise alone; particularly if it were on a plan to allow of the admission of a series of comparative designs.— *Cid. Birmingham, July* 1. 1837.

Winkle's Cathedrals (Vol. II. p. 184.). — I have not observed any notice of Winkle's *Cathedrals* in your valuable Magazine, since your first review of the work in Vol. II. p. 184. I have just got the last number (30.), *Illustrations of the Cathedral Church of Norwich*, containing what are called *three highly finished engravings on steel.* I should like to know what is meant by highly finished engravings. Surely, not the loose scratches bound up in this number, which are anything but highly finished. In addition to the bad drawing, they are so undecided and indistinct, that I very much doubt if the places would be recognised from these feeble representations. If one or two plates of the work had been bad, we might not have minded it so much; but the recent numbers have been going on from bad to worse. Surely, this is not judicious: if the work does not pay, it would be better to give it up, or raise the price, than impose such rubbish on the subscribers. I subscribed to the work from the commencement, and shall continue to the close, because I dislike a few numbers only; but the shilling a number is a shilling too dear when we cannot look upon the work with satisfaction. These plates are no recommendation to the other works of the same artists; and they have certainly kept me from subscribing to the *Foreign Cathedrals*, and, I should think, others, from the same cause. — *B.*

Bland's Experimental Essays. — I have been exceedingly gratified with Mr. Bland's "Experimental Essays on the Principles of Arches, Piers, But-

tresses," &c. The subject is treated in a manner so clear and satisfactory, that it leads you at once through the mysteries of the science, without wading through voluminous theories, which too often prevent, instead of giving, instruction. These essays I should recommend to young artists as practical studies; at the same time, Hutton, Atwood, Ware, Riou, and others, should be carefully perused. — *E. B. Lamb. London, April*, 1837.

The new Houses of Parliament.— Though, in point of taste, I am not an exclusive admirer of either the Grecian or the Gothic style of architecture, I not only disapprove of the latter style for the houses of Parliament, as a flimsy manner of building, which, on reference to all our cathedrals, churches, and mansions, except always gloomy prison-like castles, is in continual want of repair: but I object to the site as unsuitable from its locality. As to the historical associations connected with the site (see the report of Lord Lansdown's speech, in the *Morning Chronicle*, for April 18.), they may be kept up by the preservation of Westminster Hall.

I appeal to every candid observer, who has had an opportunity of even slightly inspecting public buildings in the classical and Gothic styles, both in Britain and on the Continent, whether the former are not, from their simplicity, and the small portion of surface and angles they present to the atmosphere, far less expensive to keep in repair, and far more durable, than the latter.

I would therefore, notwithstanding the delay and the expense (which I conceive to be nothing in a case of such magnitude), revive the competition, and leave not only the style, but the site, open to competitors. A suitable plan, in my opinion, ought first to be formed, and then a site found for it. A site being given, always implies the necessity of some kind of restraint on the part of the designer, some peculiarity to which he must pay deference. No perfect plan can be formed under such circumstances. — *J. E. B.*

Warming and Ventilating.— Being desirous of thoroughly heating and ventilating the villa I contemplate erecting, I have had occasion to hear opinions from several eminent architects and others on these subjects since I came to town; and have certainly been a good deal surprised at the unphilosophical views which appear to be generally entertained respecting them. Most of the gentlemen whom I have consulted have confined themselves to advocating some particular plan or nostrum, and seem not to have taken any general view of the question, or to be rightly aware of what is really wanted, or of the probable means of attaining it in different circumstances. With many persons, the providing for a certain temperature, and the means of imparting it to certain portions of buildings, seem to be the sole objects aimed at; and accordingly I have seen, within these few days, a part of a large establishment, which is conducted by a gentleman of acknowledged talent, warmed by a number of gas flames directed against surfaces of cast iron, as if the transfer of the heat from the air to the iron would increase its absolute effect, and as if the air vitiated by the combustion of the gas were not prejudicial to the health of the persons exposed to it.

I feel some surprise at the unacquaintance of many architects with the plans adopted in the construction of the Derby Infirmary, and with the fundamental principle laid down by the late Mr. Strutt, in regard to warming and ventilation; viz. the necessity of insuring salubrity, by giving the temperature required through the medium of large volumes of air at very moderate temperatures. The application of this principle renders it necessary, not only to attend to certain circumstances in constructing the apparatus which is to impart the required warmth to the entering air, but to provide a system of duly regulated passages for its entrance and exit in all parts of the structure requiring to be heated. If the heating apparatus is so contrived as to heat only a portion of the air required, and to give out this portion to be mixed with colder air admitted from other sources, it is plain, that, in order to raise the temperature of the mixed mass to a certain point, the portion which has

passed through the heating apparatus must have been heated much above this point. This cannot be done without producing bad effects of various kinds; and whatever construction of heating apparatus be adopted, it will be found expedient, where salubrity is aimed at, to give such superficial developement to the heating surface, as to enable it to communicate the required temperature at once to the whole supply of air which is allowed to enter the building, and which should all be made to pass through this apparatus before it is distributed. When the sectional area of the different air passages is properly proportioned, the heat of the current of air issuing from the heating apparatus should not exceed that of the blood, and, where circumstances will admit of sufficient developement, may, with great advantage, be kept as low as 65° Fahr.: in this case, however, the supply must be very voluminous, and the exit proportionally wide. — *T. D. April*, 1837.

Mr. Hansom's Design for a Town Hall and Market-House. (Vol. III. p. 569.) — On looking over Mr. Hansom's design for the town hall and market-house to be erected at Lutterworth, I was very much surprised to find in the principal elevation, which is to face the High Street, no doubt the best street in the town, only a blank wall on the principal floor, with half columns in antis, surmounted with its entablature and pediment. In your excellent Magazine, you have often pointed out the absurdity and inappropriateness of half columns, even when there have been openings between them; but in this design you have a slice of a portico without any means of getting at it (I cannot say under it); and a large building, placed in a conspicuous situation, without any windows in it; standing like a being endeavouring to assume an aristocratical dignity, but failing in his attempt, from the want of the expression of eyes; for, alas! he is blind. In architecture, I conceive it to be an invariable rule to make the most useful parts ornamental, leaving the less useful subordinate. Now, in this design the contrary appears to be the case: thus the windows are placed in the corners, if I may so call them, with very little decoration; and the blank wall, which serves the meaner offices of the building, is decked out with all the pomp of fluted columns, entablature, and pediment; which is as totally inconsistent as it would be to see a lady attired in the costume of a waiting-maid, and the maiden bedizened with the sumptuous ornaments of her mistress. One other small fault I will just mention in this elevation, which is the arched windows on the one-pair floor, of narrow openings, over a straight-topped opening of wide dimensions on the ground floor. Now, in this there is an evident inconsistency: in the first place, the arch does not well harmonise with the severe Grecian character intended in the building; and, in the next place, if it had been found necessary to construct arches for windows of small dimensions, it would be equally necessary to have the same kind of construction in large openings. It will scarcely be required to say more on this subject, as the reader may turn to the perspective view, and judge for himself. A wide opening in any quick sweep, as it is called by the workmen, always produces a disagreeable effect, as witness many buildings about London; where, for the convenience of having an entrance at the circular corner, the foundation of the house appears to have been removed, and the building is suspended in the air.

In making these remarks, it may be expected that I should point out some remedy for the evils complained of. This I have endeavoured to do in the accompanying plan (*fig.* 93.). Mr. Hansom says that "the Building Committee had in their calculations restricted themselves to the prospect of having such a room only as might be included in the length of this front line, although they wished for something much larger." For this reason, the plan *fig.* 94. is in the form shown in *fig.* 93. by the outline. Now, let us examine how far Mr. Hansom has succeeded. The dimensions of his room, he says, are 50 ft., including the semicircular ends; which ends will take about 13 ft. out of the extreme length; and one end is occupied by the stairs. The width of the room, he says, is to be 26 ft., thus making the square part of the room 37 ft. × 26 ft. = 962 superficial feet, less the triangles, which are cut off, being

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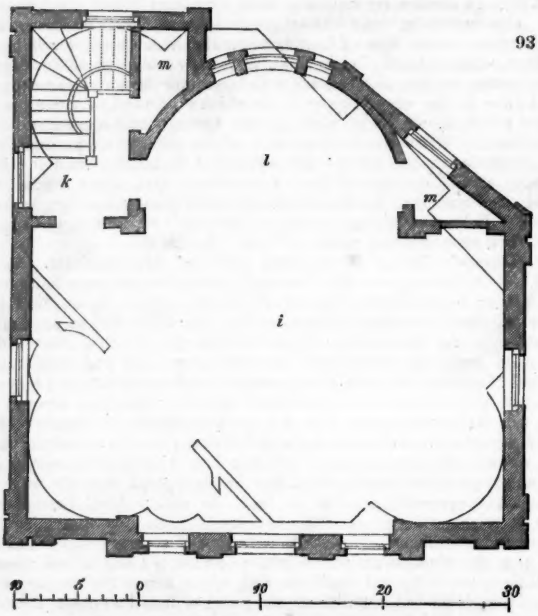
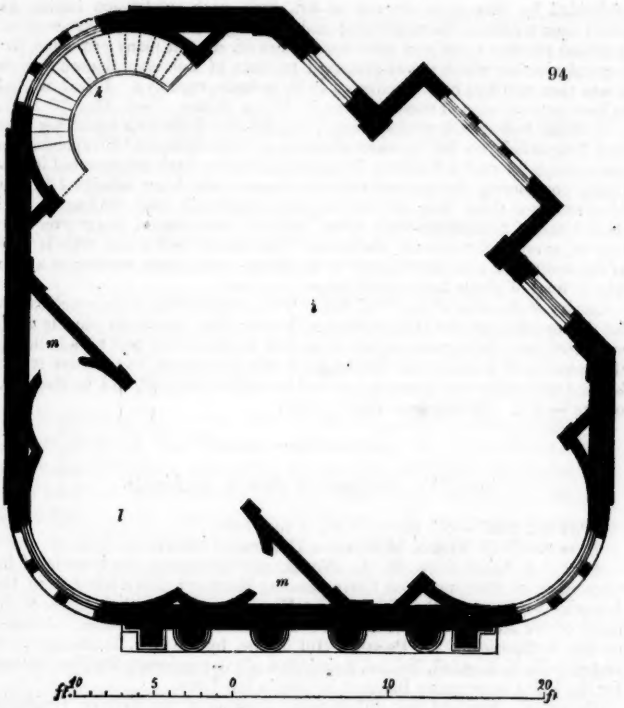


two squares of $4 \times 4 = 16 \times 2 = 32$; which, being deducted, will leave 930 ft., the actual superficial contents, exclusive of the recesses. Now, by making the principal room parallel to the principal front of the building, and thus making use of the blank wall for windows, the dimensions of the room would be as follows:—The square part, 39×23 ft. 6 in. = 916 ft. 6 in., which is 13 ft. 6 in. less than in Mr. Hansom's plan. (*fig.* 94.) But in that plan I have not taken into calculation the recesses, which would certainly give more space: true, but I have given a much larger committee-room, the same number of closets, and stairs 4 ft. wide, instead of 2 ft. 9 in., as in *fig.* 94. as shown in *fig.* 93. Again, let me observe that, if more space were required in the public room, there would be no difficulty in making it 26 ft. wide, and still retaining a committee-room somewhat larger than in *fig.* 94. In that case, all the angles would be cut off, which would make the size of the room of the following dimensions: — $39 \times 26 - 18 = 996$; to which may be added the superficial area of the recess, gained by having pilasters instead of half columns in the exterior, about 21×1, making together 1017, which will be a greater number of superficial feet than in *fig.* 94., including all the recesses. The advantages gained by this arrangement would be, in the first instance, more room in the staircase, which also would take less room from the market-house; a separate entrance from the landing to the committee-room; and windows in the principal front: which latter I consider to be a desideratum, and which ought to have been obtained, even at a small sacrifice, in a building which has such great pretensions to architectural character. I trust Mr. Hansom will excuse these remarks, as there may be reasons for his adoption of the plan he has given in *fig.* 94., which I am totally unacquainted with. Be this as it may, as criticism is one of the principal means of maturing our ideas upon all



subjects in the arts, where taste is required to be united with convenience, observations of this nature may not be unimportant. I have taken the dimensions and scale from the block plan, which, I suppose, is most correct, as the scales attached to the other plans do not agree with the dimensions required. This is evidently a mistake. — *Zero.*

Art. III. *Queries and Answers.*

The Architectural Treatment of Warm and Vapour Baths. — Has it ever occurred to you to treat the subject of warm and vapour baths architecturally? Something is wanted in this department; for the dearness and bad arrangement of all sorts of baths in this country is very discreditable to it. Perhaps if you were strenuously to recommend the study of the subject, some young architects might be induced to take it up, and to attempt to devise some structural arrangements in which some compromise would be made between the modes followed in the East, where promiscuous assemblage diminishes the expense to individuals, and those which the feelings and habits of Englishmen render necessary for their comfort. For example, the sudarium of a vapour bath might perhaps be made, as in Turkey, in one large chamber, but

subdivided by wire-gauze screens of 5 ft. high, each subdivision having an access from a cabinet for undressing and dressing in, with other necessaries. It strikes me that some such plan was spoken of, a good many years ago, for a grand erection which it was proposed to make in Leicester Square (which it was then said had been discovered to be private property). I shall be glad to hear your opinion of these matters. — *Henry Brown. York, May* 22. 1837.

A House with an Observatory over it. (p. 271.) — A correspondent has sent us a long article on the unreasonableness of Astronomicus in expecting to get a design for such a building for nothing; but we have not inserted it, because, considering the queries and the answers which are admitted in this Magazine, we think that of Astronomicus quite fair and reasonable, and the subject of a moderate-sized house, with an astronomical tower over it, a very fit exercise for a young architect. Why should not a man who is fond of astronomy have an observatory to his house, in the same manner as a man who is fond of plants has a green-house? — *Cond.*

Quality of American Pine. (Vol. III. p. 21.) — Observing in the specification for the erection of the Higher Market, Exeter, that American pine is used, and there being here great prejudices against its use in any part of a building, the opinions of some of your experienced correspondents, as to where it may be used with safety and advantage, would be useful to myself, and, no doubt, to others. — *Cid. Birmingham, July* 1. 1837.

Art. IV. *Institute of British Architects.*

June 26. 1837. — C. Barry, V.P., in the chair.

Elected. J. H. Vivian, M.P., as an Honorary Fellow.

Read. A letter from M. A. Blouet, acknowledging the honour of his election as an Honorary and Corresponding Member; also a letter from the Imperial Academy of the Fine Arts at Vienna, expressing their regret at the death of Sir John Soane, which had been communicated to them. A paper on the Antiquities of the Palatine Hill, Rome, by the Rev. R. Burgess. A paper by H. E. Kendall, Fellow, descriptive of the temporary Pavilion erected for the late Conservative Banquet in Gray's Inn Lane.

Presented. Pen and ink lithographic drawing of the Arch of Trajan, by Miss Cole. Whishaw's Analysis of Railways. Drawing of a Capital of the Order of the Temple of Solomon, by Sir William Chambers. A Plan for supplying the Metropolis with pure Water, by John Martin, Esq. Various pamphlets from Mr. Weale. Specimens of Stone from Cheshire, by P. Legh, Esq., Honorary Fellow. Coloured print of a Roman Pavement discovered near the India House. Two outline drawings of the Duke of Devonshire's Villa at Chiswick, being the outline of the drawings for which Mr. Lee gained the silver Medal at the Royal Academy. West Front of Greenwich Church, being the outline of a drawing for which T. L. Donaldson gained the silver medal at the Royal Academy.

July 10. 1837. — *Elected.* The most noble the Marquess of Salisbury, as Honorary Fellow; J. Medland, Architect, Gloucester, as Associate.

Presented. Plan of the Roman Forum, as restored by M. Huyot, Honorary and corresponding Member. An original Drawing of one of the Ceilings of Buckingham Palace, from the portfolio of William Chambers, by R. Wallace, Fellow. Views of the most remarkable buildings, Monuments, &c., in the City of Dublin: 4to; 1780. Description of the temporary Pavilion erected for the Conservative Banquet in Gray's Inn Lane, by H. E. Kendall, Fellow.

Read. A paper, by W. S. Inman, on a new Girder, invented by the Chevalier Martin.